The IRON AGE

November 14, 1957 A Chilton Publication The National Metalworking Weekly

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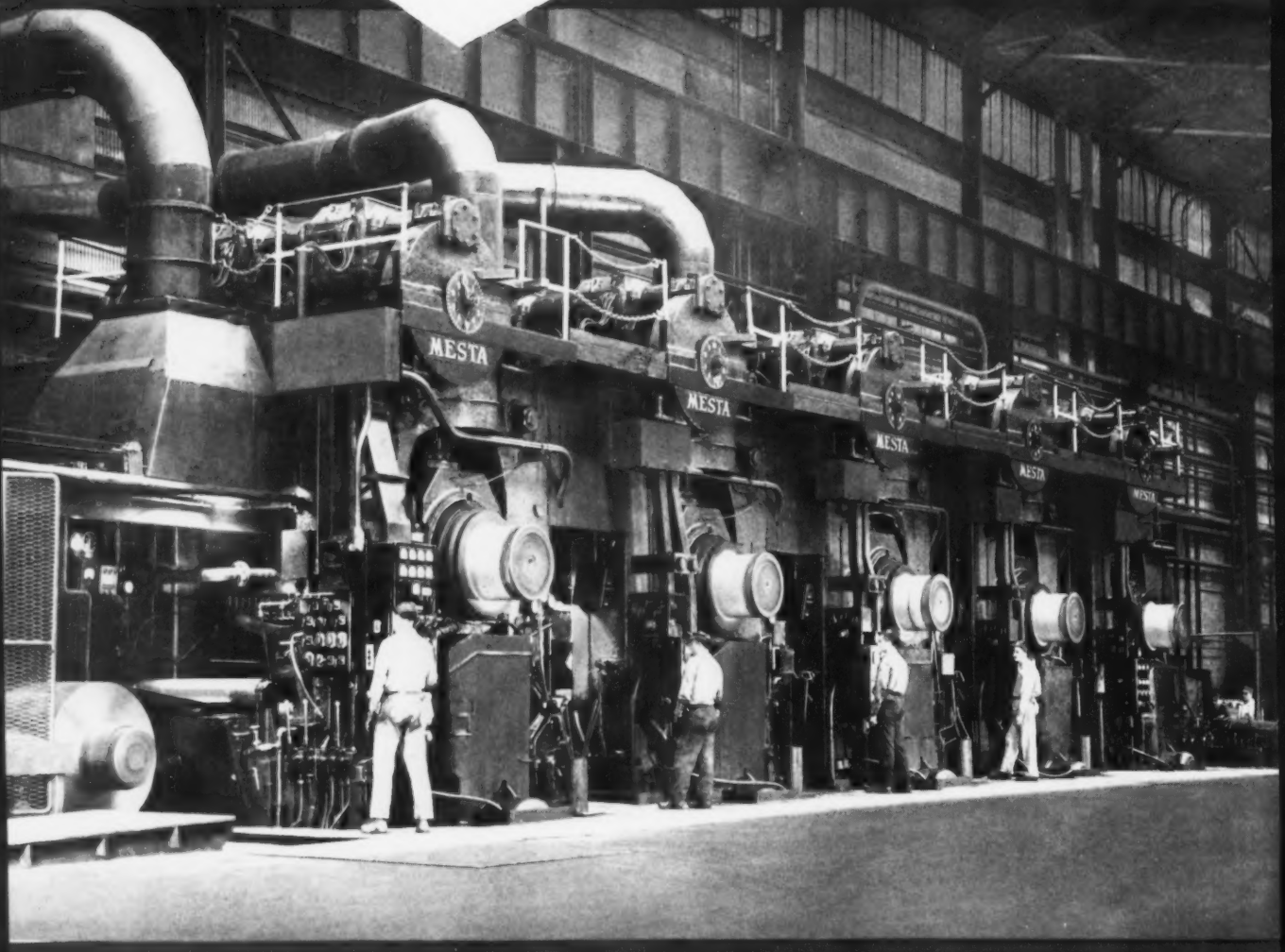
World Scientists On Who's Pacing Tech Race – P. 113

How Will Sputniks Affect Your Business? – P. 118

Digest of the Week P. 2-3

MESTA

HIGH-SPEED COLD MILLS



MESTA 20" FOUR-HIGH TWO-STAND HIGH-SPEED TANDEM COLD MILL INSTALLED IN A LARGE EASTERN STEEL PLANT

SIMULTANEOUSLY MACHINING ROLLING MILL HOUSINGS IN PAIRS ON MESTA HEAVY DUTY DRAW-CUT SHAPERS

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

XXIV

This is the twenty-fourth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Quenching and Tempering Alloy Steels

Of the various methods of heat-treating alloy steels, the most important is that involving quench and temper. This method, which enhances the mechanical properties of the end product, differs materially from normalizing and annealing (previously discussed in this series).

The purpose of quenching is to effect a cooling rate sufficient to develop the desired hardness and structure.

Before quenching takes place, steel is heated to a point above the transformation range. Quenching is the subsequent immersion of this heated steel in a circulated or agitated bath of oil, water, brine, or caustic; or, in the case of austempering or martempering, generally in agitated molten salt baths. Austempering and martempering are preferable where a minimum of distortion is desired.

Quenching *increases* the tensile strength, yield point, and hardness of alloy steels. It *decreases* ductility—that is, elongation and reduction of area. It also decreases resistance to impact. However, by means of tempering, it is possible to restore some of the ductility and impact-resistance—but only at a sacrifice of tensile strength, yield point, and hardness.

The results of mild oil- or water-quenching as related to mass effect can be found in the end-quench hardenability test. Voluminous data concerning this test are issued by AISI and SAE in the form of hardenability bands for the various grades of alloy steels.

If thermal cracking is to be avoided, cooling by liquid quenching should not be carried to a point below 150 deg F. When a temperature of 150 deg F is approached, immediate tempering should follow. Because of residual stresses, no steel should be used in the as-quenched condition.

Tempering can be defined as reheating to a specified temperature below the lower critical range, followed by air cooling. It can be done in furnaces, oil, or salt baths, the temperatures varying from 300 to 1200 deg F. With most grades of alloy steel, it is best to avoid temperatures between 500 and 700 deg because of the "blue brittleness" that occurs in this range. Maximum hardness and wear-resistance result from tempering at low temperatures; maximum toughness is achieved by tempering at the higher levels. Of course, one of the essential reasons for tempering is to relieve the residual stresses set up in quenching.

Bethlehem metallurgists have devoted years of study to quenching, tempering, and other phases of heat-treating. By all means call them if they can be of service to you. And please remember, when you are next in the market for alloy steels, that Bethlehem makes all AISI standard grades, as well as special-analysis steels and the full range of carbon grades.

If you would like reprints of this series of advertisements from No. I through No. XX, please write to us, addressing your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. The first 20 subjects in the series are now available in a handy 36-page booklet, and we shall be glad to send you a free copy.

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Chestnut and 56th Sts.
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The IRON AGE

November 14, 1957—Vol. 180, No. 20

Digest of the Week in

*Starred items are digested at right.

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U. S. VERSUS USSR

Who's Ahead? — Opinions of world scientists put the U. S. ahead

in production technique and capacity. But the Russian approach to research and development appears to be superior. P. 113

SPUTNIK ERA

Business Impact—New spending on research and development will have a strong effect on business. But it will tend to be indirect. In a special article, economist Eliot Janeway gives his opinions on how and why. P. 118

SOUTHERN STEEL

Orders Drop Sharply—Steelmen below the Mason-Dixon line are having their troubles. Imports and northern competition are undermining their market. They see hope in wider product mixes. P. 121

TRUCK DESIGN

No Tail Fins, But — Radical changes are coming. Introduction

Metalworking

FORGEABILITY: It's an important factor in the working of high-temperature alloys. This 20,000 lb hammer at Wyman-Gordon Co. does the job on a jet engine turbine blade. The key to the problem is how to reduce the variables of forging to measurable qualities. P. 153

of 1958 models inspires leading truck makers to discuss future trends. Look for more styling emphasis. P. 130

DEPT. OF RESEARCH?

Post Advocated—Dept. of Research and Development is advocated. It's part of Sen. Mansfield's plan to subsidize scientific training in attempt to catch up with Reds. P. 135

FEATURE ARTICLES

CERAMIC COATINGS

Raise Heat Resistance—New refractory materials and special fluxes make it possible to apply thin ceramic coatings to super-alloys. The ceramics offer heat-corrosion resistance in the 2000° to 2500°F range. Other properties include chemical resistance, good heat reflectivity. P. 157

NEW NYLON USE

Apply as Coating—A new process developed in Germany makes it possible to form smooth, flawless coatings of nylon on metal, wood, glass or ceramics. The part to be coated is preheated and dip-coated in nylon powder. The thickness of coating can be varied from 8 to 40 mils. P. 160

THICK-WALL VESSELS

Tips on Welding—The process industries are calling for thick-walled vessels that will withstand high temperatures, high pressures, and corrosive conditions. It takes a great deal of care to insure sound welds. P. 162

MACHINE BRUSHING

Strengthens Large Parts — An automatic brushing unit, designed especially to handle large aircraft parts, effectively reduces concentration of stresses in the precision parts. It gets a finish that cannot be approached by manual methods without excessive time. P. 165

TOOL VIBRATION

Powdered Metal Assist—By supporting carbide and oxide cutting tools in powdered metal bodies, vibration at the cutting edges can be lowered markedly. It means faster machining, better finishes and longer tool life. P. 166

MARKETS & PRICES

TOOL AND DIE OUTLOOK

Depends on Automakers—News of programs for 1959 car models indicates big orders may be on way to tool and diemakers from Detroit. Industry's dollar totals for the year are up. P. 122

WEST COAST TEMPO

Slower, But Still Steady—A look at new industries in the West or those expanding is reassuring after news of aircraft layoffs. Among planned expansions is a $2 million Kaiser Steel program. P. 137

IMPORTED MACHINE TOOLS

Sales Are Climbing—European builders have accepted the challenge their units were too light and underpowered by American standards. They're now ringing up U. S. sales with low priced tools. P. 139

SLOW STEEL MARKET

Trend Continues—Steel is entering a period of lethargy that is likely to continue for the rest of the year. Mills begin cutting back on inventories. P. 207

PLATING EQUIPMENT

Demand Is Down — Manufacturers of plating and anodizing machinery are getting ready to meet a buyers' market in the next six months. Big trend in the industry is toward units which are more fully automated. P. 208

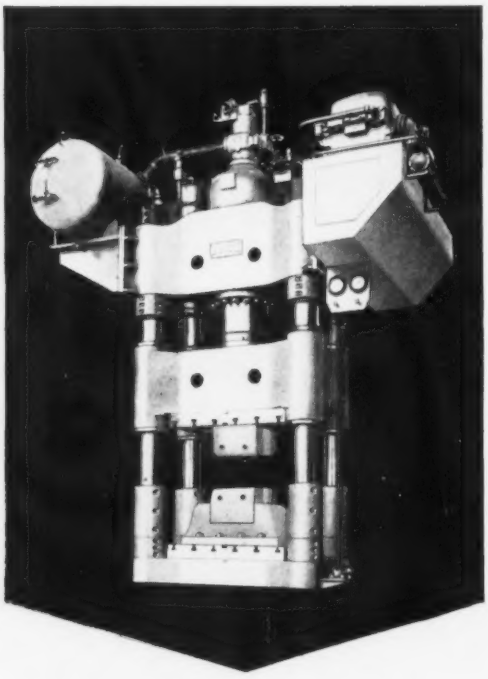
NEXT WEEK

DEFENSE SPENDING

Pattern Is Changing—How much will the high-powered missile program affect government buying of conventional weapons? Next week's feature will consider the fate of 'old fashioned' programs such as stockpiling and machine tool layaway.

PRESS or HAMMER?

..which is best for your forged product?



When it comes to open die forgings, there are as many different opinions on what equipment is best as there are open die forge shops and open die forgings.

But, before adding any new equipment, the wise forge shop operator talks with Erie Foundry Company . . . the firm that makes the best in *both* hammers and presses!

Erie's all-steel open die hammers, single frame and double frame, have justly earned their reputation as the industry's most rugged hammers. And now the newer, fast-acting Erie flat die forging presses are proving to be the ideal equipment for meeting the most exacting requirements for any hydraulic press.

So . . . which is best for you—hammer or press? For expert and *specific* advice, talk to the recognized leader . . . Erie Foundry Company. Just call or write.

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• Cutlery manufacturers know well the name SHARON, for in the past five decades SHARON has excelled in the production of steels used in the manufacture of implements for cutting.

From exquisite carving blades to rugged chain saw teeth, razor sharp scalpels, agricultural and earth moving equipment SHARON provides the edge holding and abrasion resistant steels manufacturers can trust.

If you make products that require cutting edges that endure we suggest that you contact the SHARON representative nearest you and take advantage of this vast library of experience.

SHARONSTEEL

For 56 Years a Quality Name in Steel

174

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Full Mobilization: It's More Than Just Things

We need material things to meet the challenge of survival that faces us this minute. Our armed forces must be made a proud avocation. We must have conventional military strength for brush fires. This will save us from threatening to use—and perhaps having to use—the supreme weapons of total destruction.

We must upgrade our education of engineers and scientists, raise the standard of our teachers and re-instill the desire to learn. We must help make it again patriotic to love one's country. All of this sounds simple? Yes! But many of us remain indifferent.

We are rooted in the ways of Civil War thinking. To believe that we "have time" is fantastically suicidal. We haven't the time! The "next" time we won't have France to bleed, England to hold fast, or Belgium to go down.

We can't assume that the leaders of Communism will use logic and reason. We can't let down our guard or "do little or nothing." If they thought for one minute they could give us the one-punch and win, they would do it.

The more we fall behind the more there is a chance that Khrushchev or his successor will make the fatal blunder and cast us all into hell. That is no longer a possibility, it is a probability.

But the material things alone will not protect us. We may get the engineers, the satellites, the new and more potent weapons. We may catch up with the Red progress in missiles and outer space techniques. We may even get ahead of the Reds. But that isn't the whole story. We will never match the Reds unless we have the same fervor they have. Already the Russian people are drunk with nationalistic pride of achievement.

We need iron discipline of the spirit—the moral and personal kind: The kind that says freedom and survival of our country come ahead of hedonistic pastimes. We need a rebirth in what it means to believe in the dignity of man. We use the words, but it is lip service.

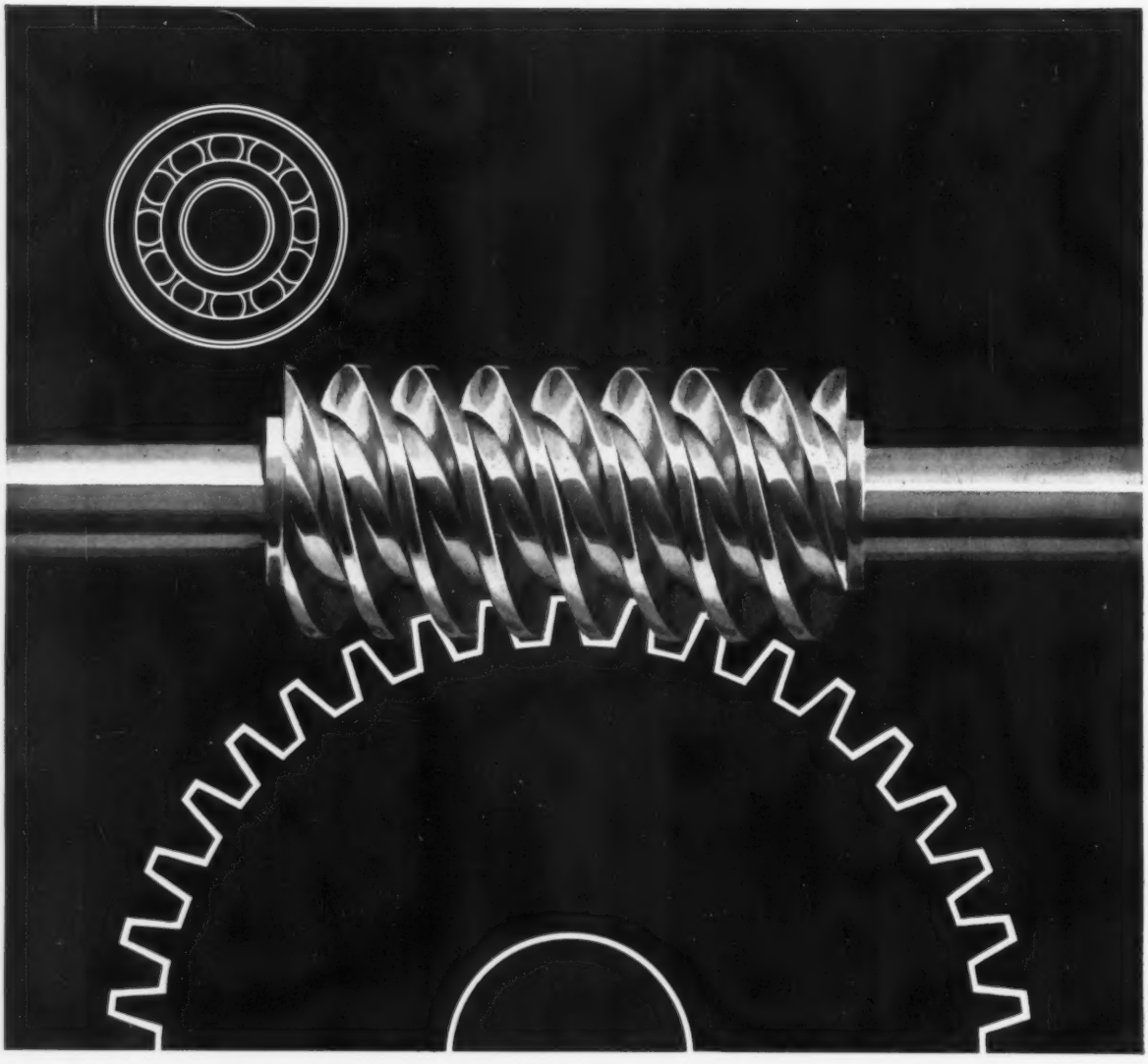
We need the Love of God to make us realize that what we have is not the happy coincidence of our inflated egos. It would be too late to learn this only after we have lost our souls and our freedom.

We need readiness for sacrifice, ability to endure, honesty of purpose, humility of person and a basic desire to do more than just exist.

We are on trial now!

Tom Campbell

Editor-in-Chief



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Public Service

Sir—You ought to be complimented on the public service you performed in the publication of such articles as, "There Is No Easy Way Out Of Skilled Labor Shortage" published in The IRON AGE Oct. 17 issue. You have done an excellent job of presenting this special report. It certainly points up the problems mentioned by Secretary of Labor Mitchell and under Secretary O'Connell.

Spur Interest — The following week you presented several other special reports, "What Will Your Industry Be Like In The Year 2000?" and "Can We Get Enough Technicians?" These two articles should prove of some value in awakening interest where it does not exist, and strengthening interest where it does exist.

Such articles are of great assistance to the Bureau of Apprenticeship and Training in their promotional efforts. Keep up the good work.—J. D. Dolan, Area Supervisor, Dept. of Labor, Bureau of Apprenticeship and Training, Phila.

New Product Report

Sir—In my opinion the Oct. 17 issue of The IRON AGE is truly outstanding. Accept please this humble expression of my appreciation and congratulations.

I do wish it were possible for me to have sufficient copies of the Survey Report article, "How to Plan New Products," to hand to my classes in management engineering. It so happens that I have been attempting to put over this matter of new product development, but my efforts apparently are not too successful. Irrespective of my own ineptness you have done an outstanding job on this issue.—G. S. Schaller, Prof., University of Washington, Dept. of Mechanical Engineering, Seattle.

Pull Up Your Socks

Sir—Your recent editorial, "Pull Up Your Socks: It May Get a Little Sloppy," created a good deal of comment within our organization. Some of our major executives have expressed a desire to reprint the article in a future issue of our internal News Letter.

May we have your permission?

Our congratulations on a very interesting and timely article.—W. E. Stoehs, Advertising Mgr., Peter A. Frasse & Co., Inc., Lyndhurst, N. J.

■ Permission granted.—Ed.

Vital Info

Sir—I found much interest and vital information in the Sept. 12 article, "You Can Cut Costs Through Tight Inventory Control."

Will you kindly favor me with twenty reprints of this article, as I would like to distribute them to our Inventory Control Personnel at our manufacturing plants — Berwick, Pa., St. Louis, Mo. and Huntington, W. Va.—L. L. Bitzer, Supervisor, Production and Planning, American Car and Foundry Div., ACF Industries, Inc., New York.

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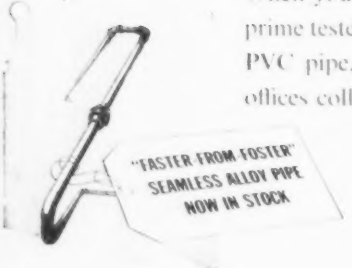

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Engineersmanship

Gamesmanship, you may know, is the art of cheating at games without really trying. For example, if you're playing chess with an expert, concede the first game after the fourth move. To his surprised glance you carefully point out there was no use to continue—you had figured out already that you would lose twenty-one moves later anyway.

This is calculated to unnerve him so much that you sweep to victory in succeeding matches.

Get the idea? Well, the Benson-Lehner Corp., Los Angeles, has come up with a similar game tailored to the needs of many of our readers. It's called Engineersmanship. Here are a few examples:

BE HARD TO GET—

When you apply for your first job take the offensive. Remember industry is looking for aggressive young men. Interview your interviewer, this will make him realize you are in demand. If he's offering $6400, let him try for $12,800.

KEEP 'EM HOPPING—

Keep the chief engineer on his toes. If he comes in to look at a working model, stand beside it with a cigarette in your hand. As the smoke rises, the chief engineer will leap for the power plug to pull it out of the wall. This gives him a chance to show everyone standing around that he is a quick thinker and a man of action, and gives you a chance to say, "It was only my cigarette, sir."

PLACE FREQUENT CALLS—

Place calls to the family through the company switchboard — especially if they're long distance. This will make them realize that you've come a long way from home to accept the job, and prevent them from thinking you're just a local yokel.

WEAR THEM OUT—

If you're going to give a paper read it. The audience could read it themselves 4 times faster but it does them good to slow down a bit. Beware of abstracts. Never show your hand at the beginning.

The Big Race

The first four-minute mile run by Roger Bannister thrilled track fans the world over. And speed boat enthusiasts were no less excited over Donald Campbell's new record of 239 mph. But neither can compare with the vital interest the whole world shows in the technological race between the Free World and Iron Curtain Countries.

Close Look — This week The IRON AGE editors bring you closeup view of what's going on. The special report on p. 113 represents days of hard digging and intensive interviews with leading engineers and scientists attending the recent World Metallurgical Congress.

Delegates from Britain, France, West Germany and Russia were among those queried about the latest advances in their own countries—and how American production and research stack up.

"Personally, I don't see how production can be boosted around here."

Labor and time savings are a big feature of this CINCINNATI drum-type Cleaning Machine installed in the hardware division of a big-3 automobile manufacturer. Space-saving design washes both parts and media from previous tumbling and burnishing operations, then separates media automatically.

Got a new *or* old cleaning or finishing problem? CINCINNATI engineers consistently prove time savings up to 75%, labor savings up to 81%, production increases of 120% and more! Write for details.

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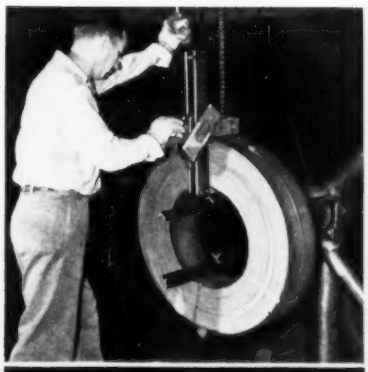


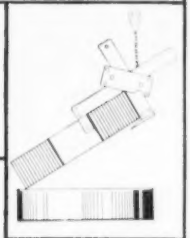
DIXON
One-Man COIL GRAB

Cuts Time and Costs With One-Motion Reel Loading

The Dixon Coil Grab saves labor and speeds coil handling by enabling one man to lift, turn and load coil on the stock reel with a single, easy motion. Forged steel wedge speeds separation of stacked coils. Positive grip and support eliminate coil damage, assure operator safety. Standard models available from stock. Capacities from 1,000 to 5,000 and 10,000 to 15,000 lbs., for coil widths ¼" to 48".

ALL MODELS AVAILABLE FROM STOCK

MODEL A COIL GRAB
Wedge separates coils easily. Lifts and turns in one motion.



MODEL H COIL HOOK
Pivoting shoe supports, turns, and locks coil in position in one motion.

WRITE FOR COMPLETE DATA
New bulletins illustrate standard models and show how to handle all coil sizes safely, rapidly, without damage. Write for them today.

DIXON AUTOMATIC TOOL, Inc.
2316–23 rd AVENUE
ROCKFORD, ILLINOIS

Equipment for Automatic Parts Handling and Assembly

EXHIBITS, MEETINGS

Eighth National Plastics Exposition—Nov. 17-21, International Amphitheatre, Chicago. (Society of the Plastics Industry, 250 Park Ave., N. Y. 17.)

Exposition of Chemical Industries—Dec. 2-6, New York Coliseum. (International Exposition Co., 480 Lexington Ave., N. Y. 17.)

Third Annual National Construction Industry Conference on Creative Trends in Structural Design—Dec. 4-5, Congress Hotel, Chicago. (Armour Research Foundation of Illinois Institute of Technology, 10 W. 35th St., Chicago 16.)

Plant Management and Engineering Show—Jan. 27-30, 1958, International Amphitheatre, Chicago.

NOVEMBER

Air Conditioning and Refrigeration Institute — 10th exposition, Nov. 18-21, International Amphitheatre, Chicago. Society headquarters, 1346 Connecticut Ave., N. W., Washington 6, D. C.

Investment Casting Institute—Annual fall meeting, Nov. 19-21, Sheraton Hotel, Chicago. Society headquarters, 27 E. Monroe St., Chicago 3.

Manufacturing Chemists' Assn.—Semi-annual meeting and winter conference, Nov. 26, Hotel Statler, New York. Society headquarters, 1625 Eye St., N. W., Washington 6, D. C.

DECEMBER

American Society of Mechanical Engineers—Annual meeting, Dec. 1-6, Statler Hotel, New York. Society headquarters, 29 W. 39th St., New York 18.

Electric Overhead Crane Institute—Annual meeting, Dec. 3, Statler Hotel, Washington, D. C. Society headquarters, One Thomas Circle, Washington 5, D. C.

American Institute of Mining, Metallurgical, and Petroleum Engineers

(Continued on P. 16)

GENERAL REFRACTORIES

bonding mortars
FOR THE STEEL INDUSTRY

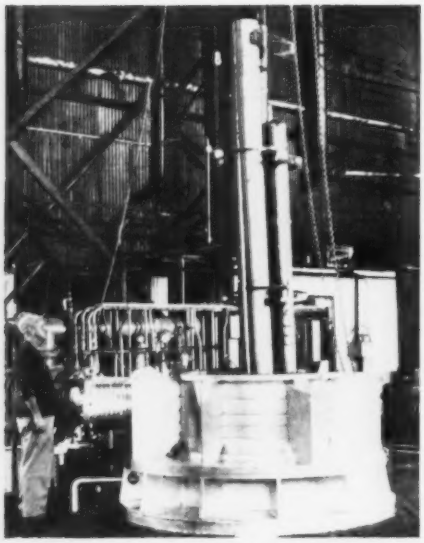
Grefco offers a wide variety of air-setting and of heat-setting high temperature bonding mortars of both the dry and wet varieties. Here are just a few:

BRIKLOK is a super duty, air-setting, fireclay base mortar which sets hard and develops high strength merely upon drying. It is widely used for laying, coating and patching fireclay and silica brickwork. BRIKLOK has good resistance to slag and abrasion and withstands temperatures up to 3056°F. BRIKLOK A is a wet mixture while BRIKLOK is furnished as a dry powder.

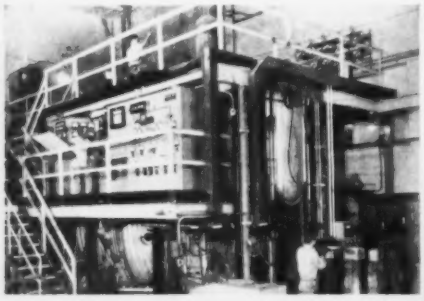
GREFCO SILLIMANITE is a highly refractory mortar with a base material consisting mainly of mullite crystals. This insures very high refractoriness and freedom from shrinkage at high temperatures. This high quality mortar is recommended for laying up and coating fireclay, high alumina or SILLIMANITE brick, and should always be used wherever a mortar is required for the latter.

SILLIMANITE 343 is a wet air-setting mixture. SILLIMANITE 340 is a dry heat-setting mixture. Consult your Grefco representative as to which of the several varieties best suits your needs.

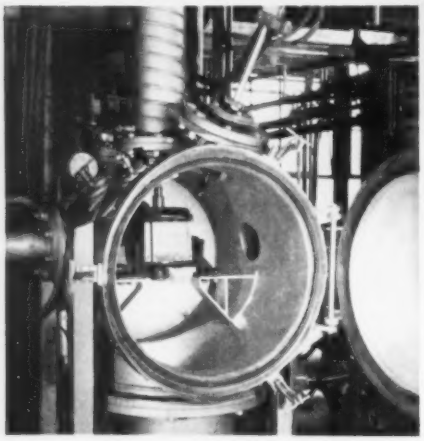
GENERAL REFRACTORIES COMPANY
Philadelphia 2, Pa.



Vacuum Resistance Pit-type Furnace, used by Rem-Cru Titanium, Inc., to heat treat titanium mill products up to 12 ft. long by 4 ft. wide. Standard resistance furnaces available in bell, pit, and horizontal muffles with hot zones from 2" to 54" I.D.



World's largest vacuum induction furnace with 3000 pounds capacity, installed at Crucible Steel Corporation of America. Capacities of standard induction furnaces range from 12 to 5000 lbs. of molten steel.



Vacuum Arc Furnace has interchangeable consumable and nonconsumable electrodes for melting into either cold mold or skull for titanium shape castings. Standard arc furnaces available from 10 to 10,000 lbs.

Why Put "Two-Bit Performance" in a $1,000,000 Product?

For about two bits you can get a pound of air-melted 52100 alloy steel. However, impurities introduced by air-melting are a prime cause of failure in high stress or high temperature parts. Vacuum-melted 52100 costs nearly $2.00 more, but what a difference in performance! For instance, it adds 600% to the life of a jet engine thrust bearing. And because it is "cleaner" and easier to work, it often saves shop time and reduces rejects.

The benefits of vacuum melting are especially spectacular in the case of "superalloys" used for high temperature applications such as jet engine blades and rotors. One blade producer found that replacing air-melted with vacuum-melted superalloy increased stress rupture life 40%, ductility 100%, and tensile strength 12%. Best of all, it halved the cost per satisfactory blade!

Vacuum pays for itself outside the aircraft industry, too. Included on the growing list of high performance products benefit-

ting from its use are bearing races, jewelers rolls, bolts, precision castings, valve springs, chemical process equipment, dies, electronic tubes, and watches. Besides improving the strength, composition control, cleanliness, life, corrosion resistance, conductivity, ductility, and workability of existing materials, vacuum melting allows you to develop new alloys which are impossible to produce in conventional furnaces.

If you'd like to know whether vacuum metallurgy can improve your product and cut your costs, let us know. We'll be glad to share the knowledge we've gained from building and operating more high vacuum furnaces than any other organization in the world. If you decide to conduct your own vacuum metallurgical operation, you'll find that NRC is your one convenient source for a complete line of vacuum arc, induction, and resistance furnaces with capacities from a few pounds to several tons. Write today.

NRC

NRC

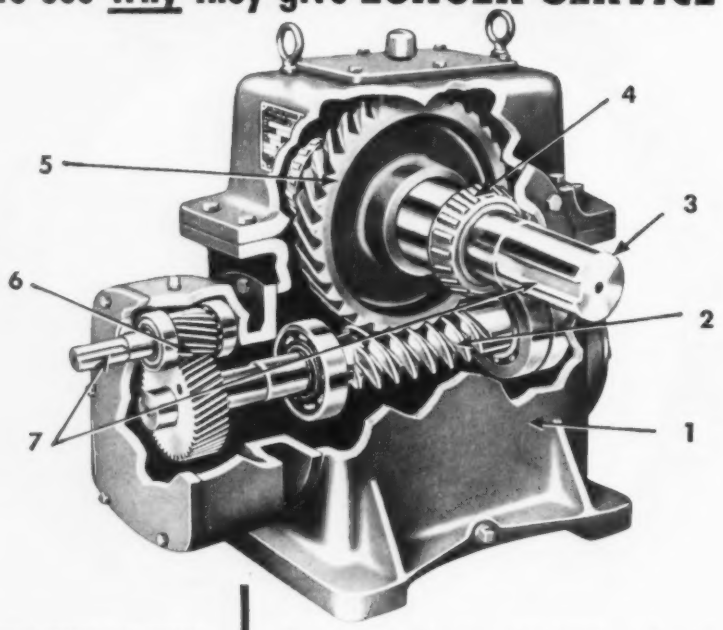
EQUIPMENT CORPORATION

DEPT. 16L, CHARLEMONT ST., NEWTON 61, MASS.
A Subsidiary of National Research Corporation

Look Inside a Foote Bros.

ENCLOSED WORM GEAR DRIVE

to see why they give LONGER SERVICE



1 EXTRA STRONG CAST HOUSING
Provides rigid mounting and alignment of caps and bearings. Made of high quality cast iron.

2 PRECISION ALLOY STEEL WORM
Integral with oversize shaft. Carefully matched to worm gear for quiet, trouble-free service.

3 OVERSIZE OUTPUT SHAFT

4 HEAVY DUTY, EXTRA LARGE BEARINGS
Oversize bearings used throughout unit. Worm bearings are combination single row radial and angular contact ball bearings. Input shaft bearings are single row radial type.

5 WORM GEAR
Precision generated from uniform density, high hardness virgin bronze alloy casting. High load carrying capacity.

6 HEAT TREATED HELICAL GEARS
Shaved for full tooth contact. Pinion integral with input shaft. Gear locked in position on worm shaft extension.

7 Just one of 10 different types, in a wide range of sizes, ratios and shaft arrangements.

One look at the oversize bearings, larger shafts, precision made gearing and the sturdy housing of a Foote Bros. Hygrade Worm Gear Drive tells you that *this* is a workhorse unit that will stand up and deliver under the toughest conditions.

Notice the carefully balanced design . . . greater mass where it's needed . . . the elimination of weight when it contributes nothing to efficiency . . . strength and toughness at the right places . . . the correct gear alloys . . . the compact design, and above all, the simplicity and ruggedness of this unit.

When you know the *inside* story of Foote Bros. Hygrade Worm Gear Drives, you can understand why they have built a reputation for quality, dependability, and performance that is unmatched by others.

Call in a Foote Bros. Field Engineer. Take advantage of our long experience in this business. Let us help you select or specify the most economical drive for your application.

Write for Engineering Manual HGB. It contains complete information on Hygrade Enclosed Worm Gear Drives.

this trademark stands for the finest industrial gearing made

FOOTE BROS. Duti-Rated LIFETIME BEARING

T. M. REG. U. S. PAT. OFF.

FOOTE BROS.

Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
4565 South Western Boulevard Chicago 9, Illinois

EXHIBITS, MEETINGS

(Continued from P. 13)

—Fifteenth annual conference on electric furnace steel, Dec. 4-6, Penn-Sheraton Hotel, Pittsburgh. Society headquarters, 29 West 39th St., New York 18.

National Assn. of Manufacturers—Annual meeting, Dec. 5-7, Waldorf-Astoria, New York. Society headquarters, Two East 48th St., New York.

American Institute of Chemical Engineers—Annual meeting, Dec. 8-11, Conrad Hilton Hotel, Chicago. Society headquarters, 25 W. 45th St., New York.

IRE, ACM, AIEE—1957 Eastern joint computer conference and exhibit, Dec. 9-13, Sheraton - Park Hotel, Washington, D. C. Information: IBM Corp., 1220 Nineteenth St., N. W., Washington, D. C.

The Material Handling Institute—Annual meeting, Dec. 10-11, Biltmore Hotel, New York. Society headquarters, One Gateway Center, Pittsburgh.

JANUARY

Malleable Founders' Society—Semi-annual meeting, Jan. 17, Hotel Cleveland, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

Industrial Heating Equipment Assn.—Annual meeting, Jan. 27-28, Penn-Sheraton Hotel, Pittsburgh. Society headquarters, 1145 19th St., N. W., Washington 6, D. C.

FEBRUARY

Malleable Founders' Society—Technical and operating conference, Feb. 6-7, Wade Park Manor, Cleveland. Society headquarters, 1800 Union Commerce Bldg., Cleveland.

American Institute of Mining, Metallurgical & Petroleum Engineers—Annual meeting, Feb. 16-20, Hotels Statler and Sheraton-McAlpin, New York. Society headquarters, 29 W. 39th St., New York.

Why jet engines are harnessed with *Carpenter* Welded Stainless Tubing

Reason One: For measuring their exhaust temperature. They're harnessed with the circular assembly of 1" O.D. Type 430 Carpenter Tubing shown above. Inside it are two wire loops connected to thermocouples on the engine tail-cone. Made in diameters of 12" to 36", this harness has to withstand up to 1000-degree heat, corrosive fuel and atmosphere, engine shock and vibration.

Reason Two: Type 430 Carpenter Tubing provided *more* than the strong resistance to heat, corrosion and shock, and the low coefficient of expansion required in this punishing service. Being *welded* tubing, its uniform walls, working properties and dimensional accuracy to 0.003" throughout were important production advantages for the "harness-maker". Precise bending, flaring and other fabricating operations were accomplished trouble-free.

Next time you need stainless tubing for pressure, corrosion resistance, mechanical, structural or sanitary requirements, call in your nearby Carpenter Representative or Distributor. Have him tell and show you why the quality and uniformity of the welded tubing he sells saves time, trouble and money. Meantime, send for Selecting and Buying Guide, Bulletin T.D. 120.

You are sure of getting all these tubing advantages from Carpenter:

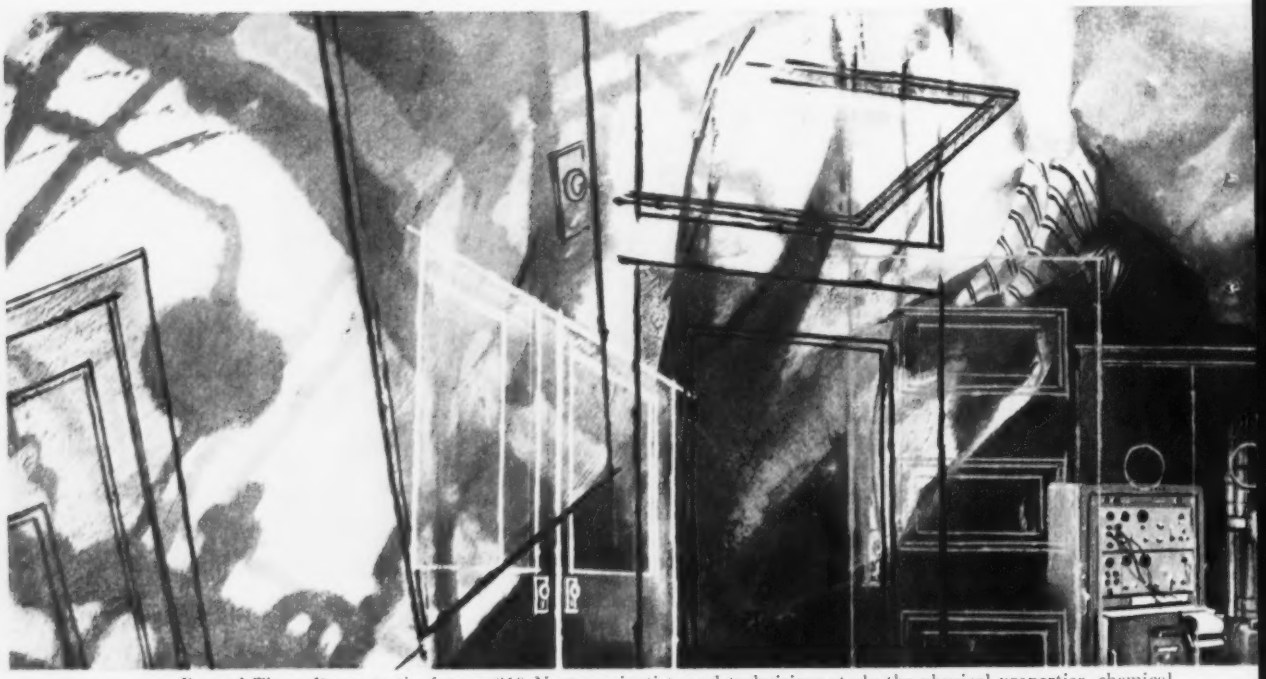
• Uniform wall thickness throughout the length of the tube • Smooth surfaces, I.D. & O.D. • Uniform analysis • Guaranteed 100% pressure tight • Maximum workability • Full corrosion resistance throughout • Heat exchanger quality • Widest range of analyses • Lower initial cost.

The Carpenter Steel Company, Alloy Tube Division, Union, N. J.

Export Dept.: The Carpenter Steel Co., Port Washington, N. Y. — CABLE: CARTEELCO

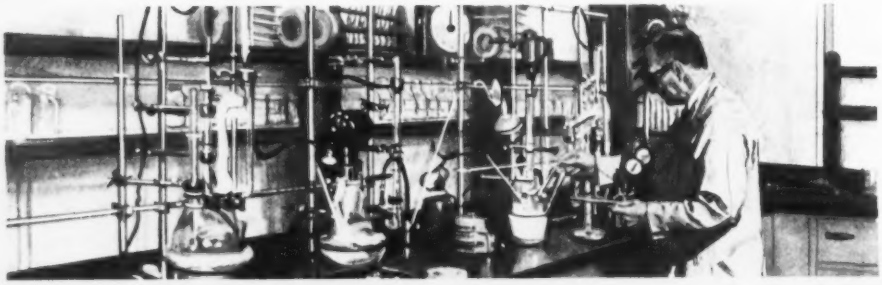
Carpenter

Stainless Tubing & Pipe

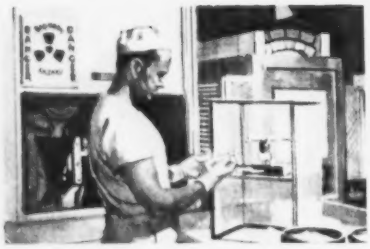


Beyond These Doors to the future, 310 Norton scientists and technicians study the physical properties, chemical

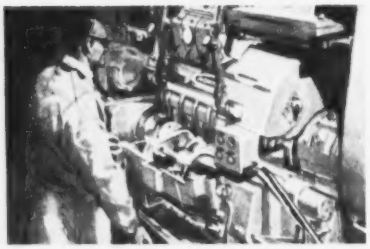
Science comes to industry



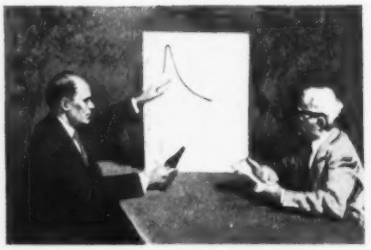
Organic Chemistry is the scientific route to developing better adhesive properties for Bear brand pressure-sensitive tapes. Adhesive ingredients have always been under constant study at Behr-Manning because they are vital, too, in the quality performance of all coated abrasive products.



Ceramic Engineering is the guiding science of Norton men who worked on the Manhattan project . . . now supervise nuclear ceramic fuels of important present use and great future potential. Each fuel pellet is molded to exact dimensions.

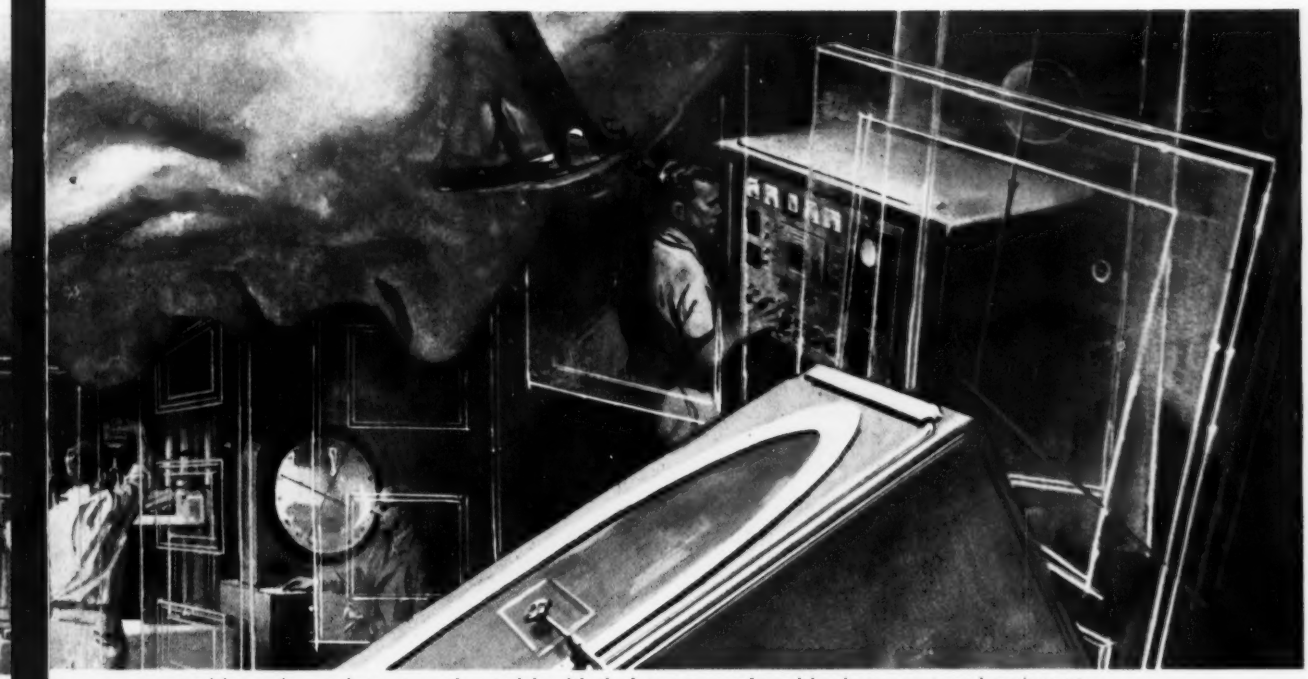


Electronics becomes a workingman on a Norton CM-1 multiwheel grinder. It questions and adjusts wheel setting, checks in-process gauge with post-checking gauge — and even signals for the operator when a problem stumps it.



Metallurgical Facts discovered at Norton are shared with all industry through published findings and improved products. A study of the effects of grinding on steel "dog bones," for instance, taught new lessons in stress and strain.

Making better products...



composition and crystal structure of materials with the latest types of precision instruments and equipment.

through a dozen doors

These doors are symbolic of the working laboratories of Norton Company. Here men of science have the "know-what" and their co-workers have the "know-how" to serve the many different industries in which Norton products are vital.

Here trained men peer into the mysteries of metals and the behavior of molecules under stress and strain. Here the thermodynamics of atomic fuels are investigated and the organic nature of tape adhesives, coated abrasive and grinding wheel bonds are explored. Services to long-established industries such as ceramics and new ones like rocketry go on simultaneously and lead to further progress. Yet, even as you are reading this, Norton, by its products, is daily giving industry that Norton "Touch of Gold" — "Making Better Products to Make Your Products Better."

Spectrography at Norton helps keep present products up to standard . . . opens up a whole new vista of the chemical nature of materials for products still in the development stage. Emission spectrograph helps.

NORTON
ABRASIVES

Around the world and still expanding

Abrasive and Grinding Wheel Plants — Worcester, Mass.; Santa Clara, Calif.; Hamilton, Ontario; South Africa; England; France; Germany; Italy; Brazil.

Behr-Manning Plants — *Coated Abrasives and Pressure-Sensitive Tapes* — Troy, N. Y.; Canada; Australia; France; Northern Ireland; Argentina; Brazil.

Electric Furnace Plants — Huntsville, Alabama; Chippawa, Ontario; Cap-de-la-Madeleine, Quebec; Brazil.

Grinding and Lapping Machine Plant — Worcester, Mass.

Refractories Plant — Worcester, Mass.

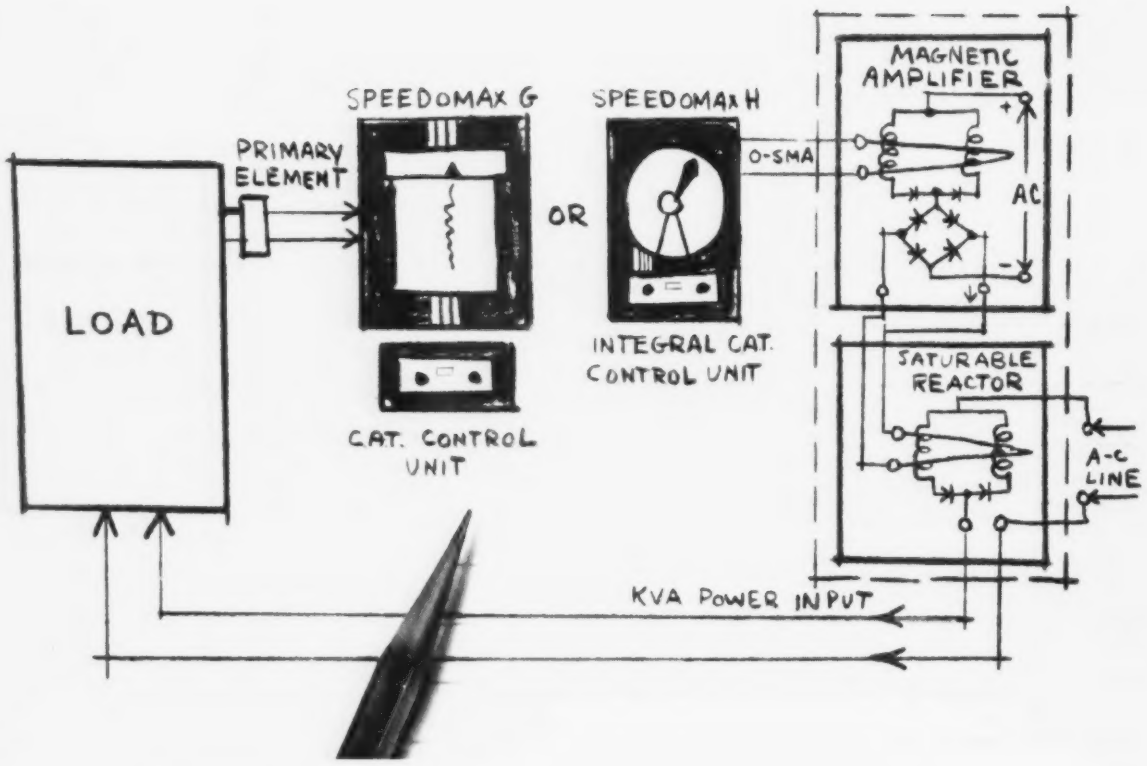
Electro-Chemical Plants — Chippawa, Ontario; Huntsville, Alabama.

Norton Pike Plant — *Sharpening Stones* — Littleton, New Hampshire.

Bauxite Mines — Bauxite, Arkansas.

General Offices: Norton Company, Worcester, Mass.

to make your products better



Now...Stepless control of Electric Heat Input with L&N's new C.A.T. control system

If your process uses electric heating equipment and your product is off-temperature due to cycling of heating elements at high temperatures . . . if excessive downtime and expensive replacement of worn-out contacts cut down production time . . . it'll pay you to learn about L&N's new Current-Adjusting Type control for continuous, efficient power output in saturable core reactor systems.

Already in use on applications like crystal growing and strip annealing, this control permits stepless regulation of power output over the *entire operating range of saturable core reactors.* Its rapid speed of response matches rapid changes in product temperature. The wide range of adjustment of proportional, reset and rate actions facilitates tuning the system to your process, product and production.

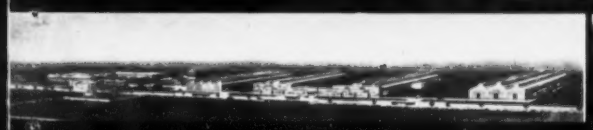
C.A.T. control is a complete system consisting of (1) a primary element, (2) Speedomax recorder, (3) C.A.T. control unit, and (4) a magnetic amplifier and saturable core reactor.

Heart of the system is the C.A.T. control unit. Any temperature change, detected by the primary element and measured by the recorder, is fed to the control unit. Continuous d-c output of the unit over 0 to 5 ma range drives a magnetic amplifier. The d-c output of the magnetic amplifier is fed to the control windings of a saturable core reactor for continuous regulation of power input to the process.

If you're modernizing your present electric process equipment or installing new—make use of our wide experience in providing temperature control systems for thousands of applications. For more information, contact your nearest L&N sales office, or write us at 4956 Stenton Ave., Philadelphia 44, Penna. Ask for Data Sheet ND 46-33(107).

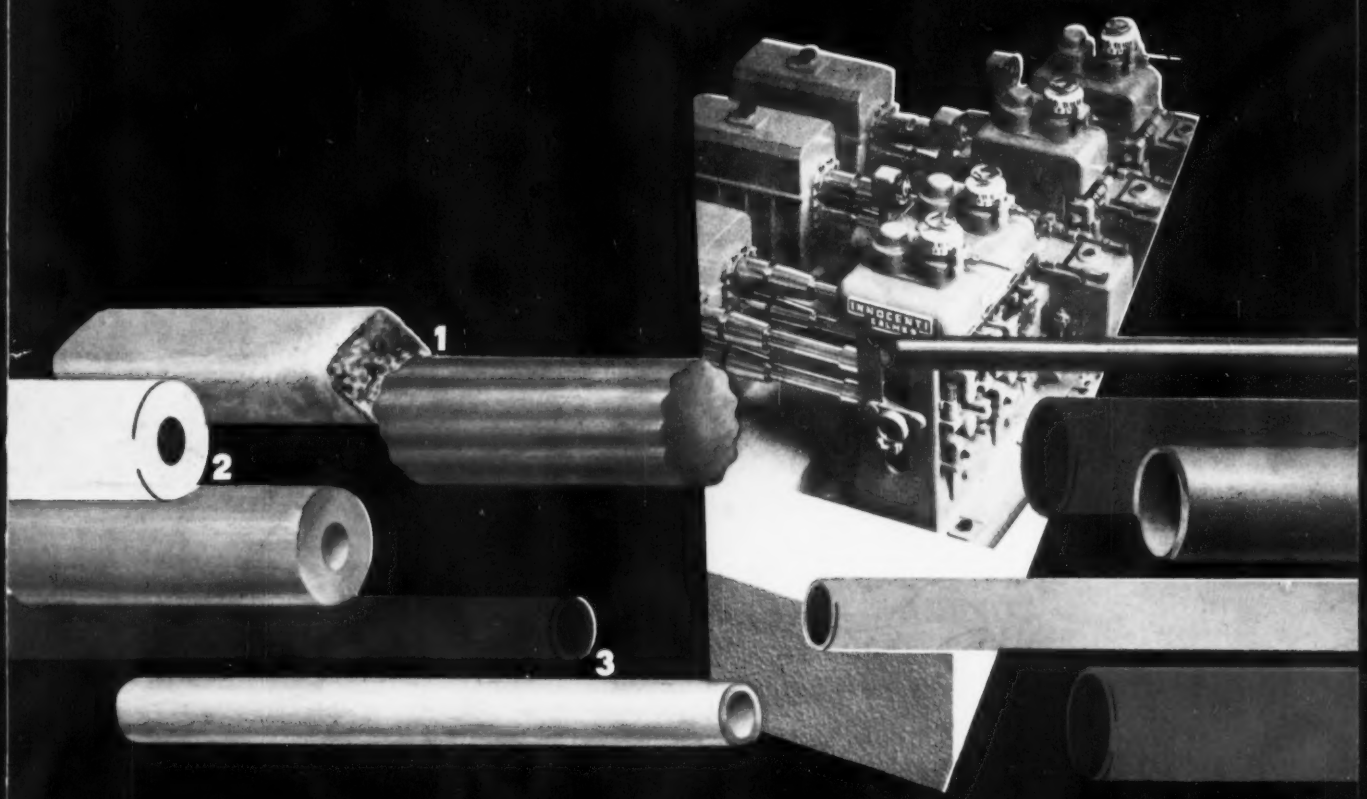
LEEDS Instruments **NORTHRUP** Automatic Controls • Furnaces

INNOCENTI



works in milan (italy)

manufacture of small diameter seamless pipes



automatic mill for the

1

2

3

bertani.t3

INNOCENTI

equipment for steel plants: hot ingot peeling machines

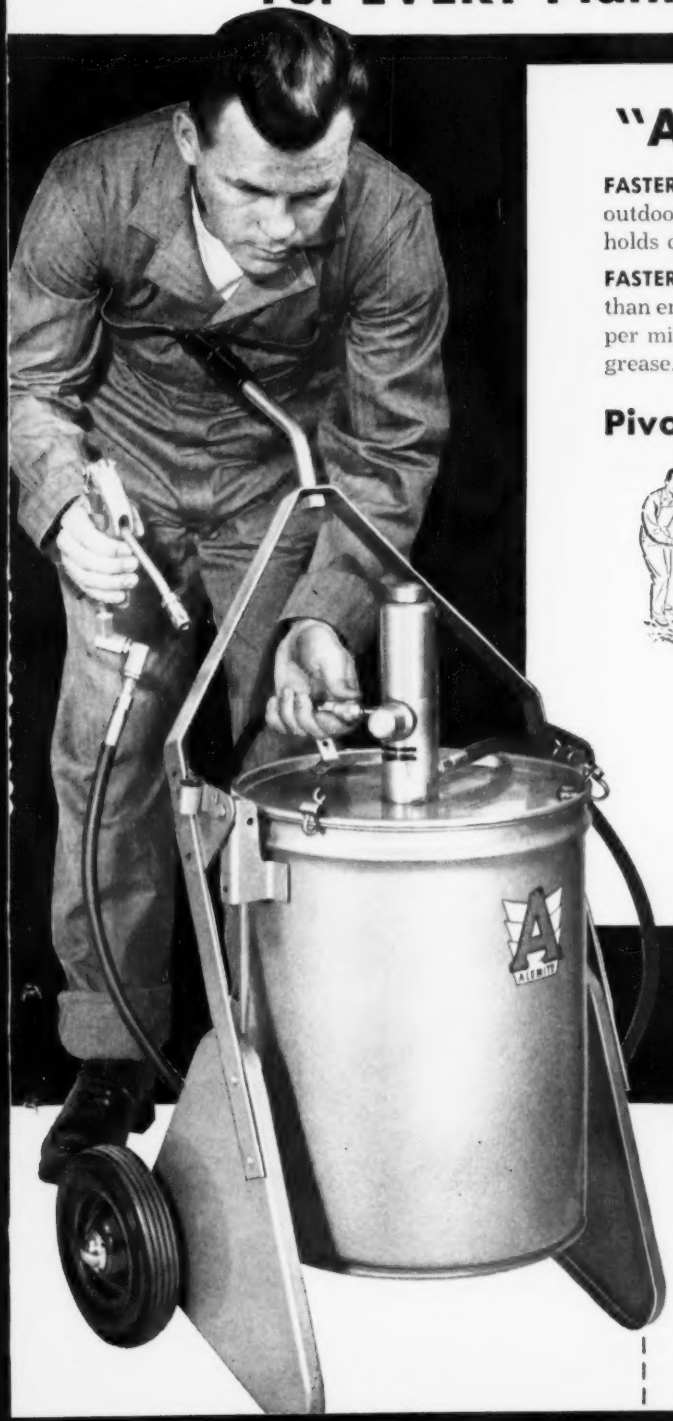
works in milan (italy)

bertani.s3.

Roll It Anywhere for Fast High-Pressure Service!

ALEMITE PORTABLE POWER GUN

For EVERY Plant Lubrication Job!



"AIR-POWERED 711-A"

FASTER—because it's easier to handle! Saves lubrication time outdoors or indoors—anywhere in the plant. Pivot-swing dolly holds container upright at any pulling angle.

FASTER—because exclusive, newly designed pump packs more than enough power for every job. Delivers 14½ oz. of gun grease per minute at 70°F. Holds 25-, 35-, or 50-lb. pail—or 70 lbs. of grease. Dynamic primer assures positive priming.

Pivot-Swing Dolly For Easy Moving...

Electric-Powered "Porta-Kart"

Only 18" wide. Easily moves through narrow aisles. Capacity, 12 pounds. Delivers 13 oz. of pressure gun grease per minute. Automatic switch shuts off motor when 5,000 lbs. of pressure is built up. *Model 7182-B.*

Step up to modern, time-saving lubrication methods! Check Alemite's complete line of air-powered and electric-powered lubricators.

ALEMITE
REG. U. S. PAT. OFF.

STEWART SW WARNER

Division of STEWART-WARNER CORPORATION

MAIL COUPON FOR FREE CATALOG!

Alemite, Dept. G-117, 1850 Diversey Parkway
Chicago 14, Illinois

Please send me your complete catalog on Alemite lubrication equipment for industry.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

Republic

POSITIVE HOLDING-POWER of Republic Nylok Bolts keeps striker plate in precise position to assure proper functioning of safety door-latch. Other advantages of Nylok Bolts include their liquid-sealing ability. When unit is fully seated in tapped hole, nylon pellet blocks escape of fluid around helix of threads.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Nylok® Fasteners Assure Positive Performance

of Safety Door-Latch Design

There is no room for error in safety engineering. Not even in the smallest detail. That's why Ford Engineers use Republic Nylok Bolts to anchor striker plate to door post.

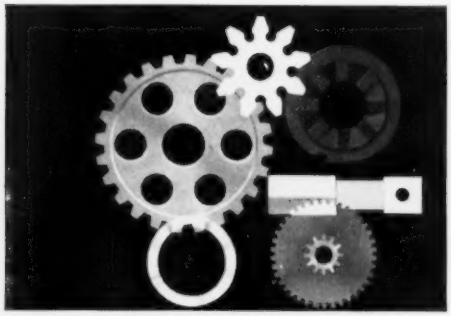
Nylok Bolts permit precise positioning of striker plate to safety latch during assembly. When torqued tight they provide a positive, vibration-proof clamping action to keep the plate locked in place. Holding-power of latch assembly is permanently maintained.

Republic Nylok Bolts have proved ideal for a wide variety of bolted assemblies subject to impact or vibration. Their relentless grip is produced through compression of a small nylon pellet imbedded in the bolt body when unit is wrenched into threaded hole. In attempting to regain its original shape, the pellet exerts a continuous, powerful lateral thrust, forcing a strong metal-to-metal lock between opposite mating threads. Lock is positive, whether or not bolt is seated. Further, this resiliency of nylon provides excellent adjustment and re-usability characteristics, and permits relatively soft materials to be locked to threaded members without damage.

In addition to design advantages, use of Republic Nylok Bolts offers many production savings. They can be hand or power wrenched with equal effectiveness. There is no galling of threads or seating surfaces. Expense of assembling extra locking devices or wiring is eliminated.

Finally, you get all the advantages of Nylok locking plus top fastener quality when you specify Republic Nylok Bolts. Complete manufacturing control from ore to finished product is your assurance of consistent peak performance.

For full information, contact your nearest Republic office. Or mail coupon.



PREDICTABLE PERFORMANCE of Republic Iron Powders is assured by our exclusive manufacturing process which provides Controlled Dimensional Factor, or CDF. This characteristic is furnished in three types of powders—Type "G" for growth, Type "N" for normal (no dimensional change) and Type "S" for shrinkage after sintering. Result is fast, accurate, economical iron powder sinterings. Send coupon for details.

REPUBLIC RECESSED HEAD SCREW, RIVET, and HEADING WIRES are specially produced to assure internal soundness and freedom from injurious surface defects. Consistently uniform quality meets the most exacting demands of modern upsetting, roll threading, and extrusion machines. Republic Wire flows freely. Fills out dies in difficult upsetting operations. Republic Wire is produced in a wide range of chemistries, physicals, and sizes. Wire metallurgists will assist you in selection, application, and processing. Write for details.

POSITIVE MANUFACTURING CONTROL assures quality in components or products, produced to your specifications by Republic's Pressed Steel Division. Facilities include presses capable of forming every gage stamping, up to the heaviest. Also, welding, brazing, riveting, machining, annealing, galvanizing, and painting operations are available. For information on extending your production capacity with Republic Contract Facilities, mail coupon.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-3841-A
3104 EAST 45TH STREET • CLEVELAND 27, OHIO

Please send me more information on:
☐ Nylok Fasteners. ☐ Contract Facilities
☐ Iron Powder with CDF

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Up to 40% higher tightening torques keep a

—and only the combination of an UNBRAKO screw

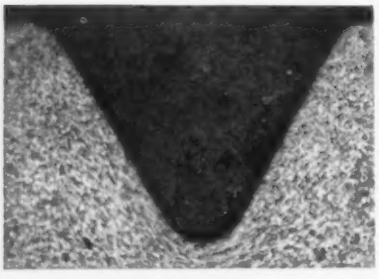
RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES
(Inch-Pounds)

SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

The High-Torque UNBRAKO socket set screw is made to withstand the highest tightening torques ever used to seat a set screw—up to 40% higher than an ordinary set screw. But to take full advantage of this UNBRAKO feature you must have a key that can apply the force required to seat it without damaging the screw or snapping the key. The High-Titan UNBRAKO hex key is designed specifically to set a High-Torque UNBRAKO so that you can be assured of full *high-torque* performance every time.

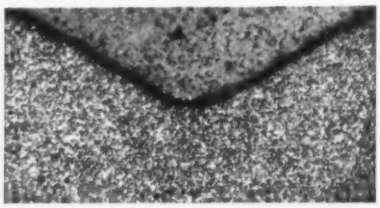
Here's why a High-Torque UNBRAKO can be seated tighter—and stay put

UNBRAKO SET SCREW



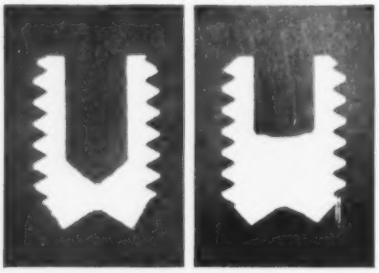
It has fully formed threads that make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see in this illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The UNBRAKO retains its flow lines even when ground down to .010 in. below root diameter. Screws with cut or ground threads lose thread form at root diameter.

UNBRAKO SET SCREW



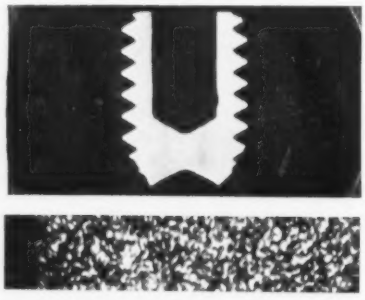
The High-Torque UNBRAKO has a radius in the socket corners. This eliminates the sharp corners where cracks start. It also distributes the stresses developed when tightening torques are applied. Ordinary socket screws have sharp corners which often crack when tightened even at lower torques than those recommended for UNBRAKO.

UNBRAKO SET SCREW **ORDINARY SET SCREW**



The High-Torque UNBRAKO has a deeper socket, which gives you more purchase with the wrench. Since more wrench can be put into the UNBRAKO socket, you can set the screw much tighter. And you won't ream the socket or round the corners of the wrench.

UNBRAKO SET SCREW

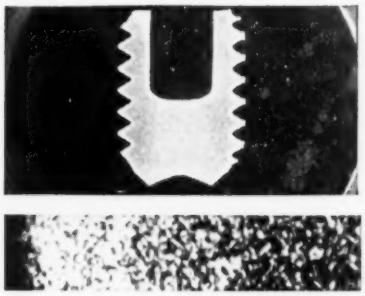


The High-Torque UNBRAKO is properly heat treated, kept clean. Its grain structure is uniform. It is free of decarburization. There's no danger of stripping the threads or shearing the point when tightening

High-Torque UNBRAKO socket set screw tight

and key assures full *high-torque* performance

ORDINARY SET SCREW



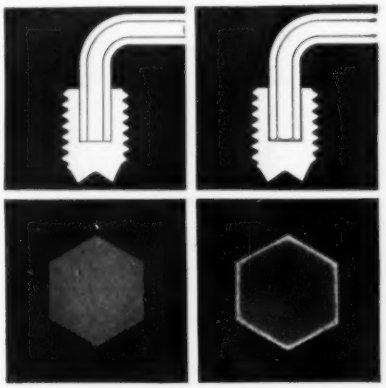
torques are applied. The ordinary screw is suffering from an overdose of decarburization; socket walls, threads and point are full of the telltale white spots that identify it.

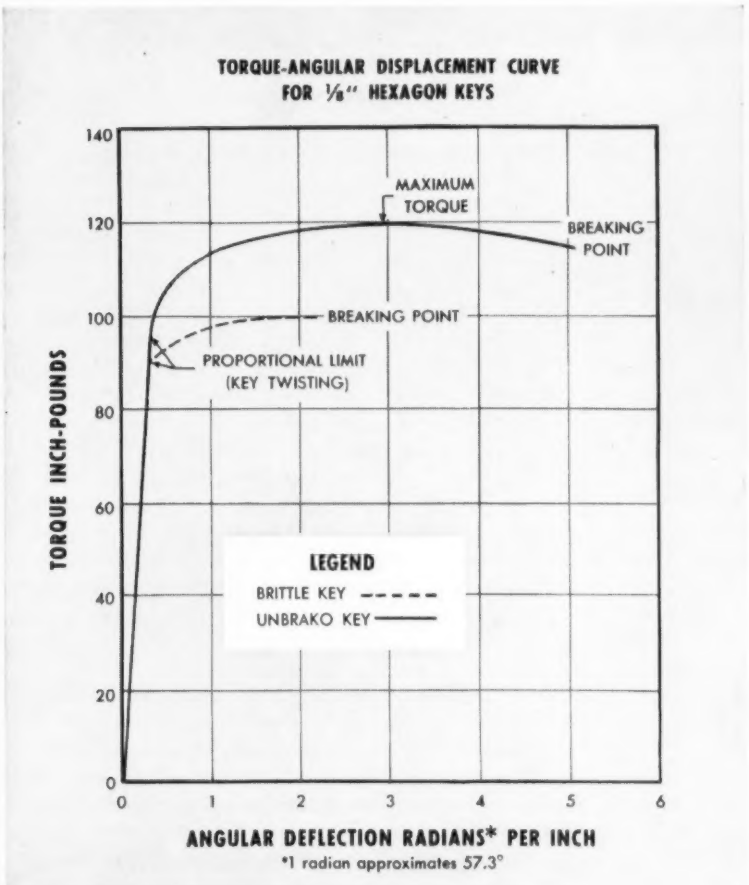
And here's why an UNBRAKO High-Titan hex key can be used to apply far more tightening torque to a High-Torque UNBRAKO socket set screw than is needed without damaging either the screw or the key.

The High-Titan UNBRAKO is not an ordinary hex key. It is a precision internal wrenching tool with high ductility, specially designed to assure full high-torque performance. It is made of special alloy steel bar stock, inspected magnetically and chemically to make sure that the material is flawless and of the specified properties. Its sides are flat and parallel. The corners, which exert torque on the inner walls of the socket, are sharp and tough. The bend is strong.

The High-Titan UNBRAKO is accurately sized across the flats and across the corners to insure snug fit and full wall contact. It won't ream or wear an UNBRAKO socket. The square cut end engages the full depth of the socket for greater tightening power. It gives you up to 25% more wrench engagement than a key with a chamfered end.

UNBRAKO KEY **CHAMFERED END KEY**





The High-Titan UNBRAKO hex key is heat treated in modern atmosphere-controlled furnaces. The surface is casehardened without decarburization. The extra hard surface gives the key longer life. And it retains its dimensional accuracy, is tougher and more ductile than ordinary keys. This torque-angular displacement curve for ⅛ in. hexagon keys distinguishes a High-Titan UNBRAKO from an ordinary key. The High-Titan UNBRAKO has a higher yield point and a higher breaking point—you can exert a much higher torque with it without snapping the key.

Be sure you get the full high-torque performance offered only by the combination of a High-Torque UNBRAKO socket set screw and a High-Titan UNBRAKO hex key. Both products are stocked by authorized industrial distributors. Ask the one nearest you for complete information. Or write STANDARD PRESSED STEEL CO., Jenkintown 17, Pa.

We also manufacture precision titanium fasteners. Write for free booklet.

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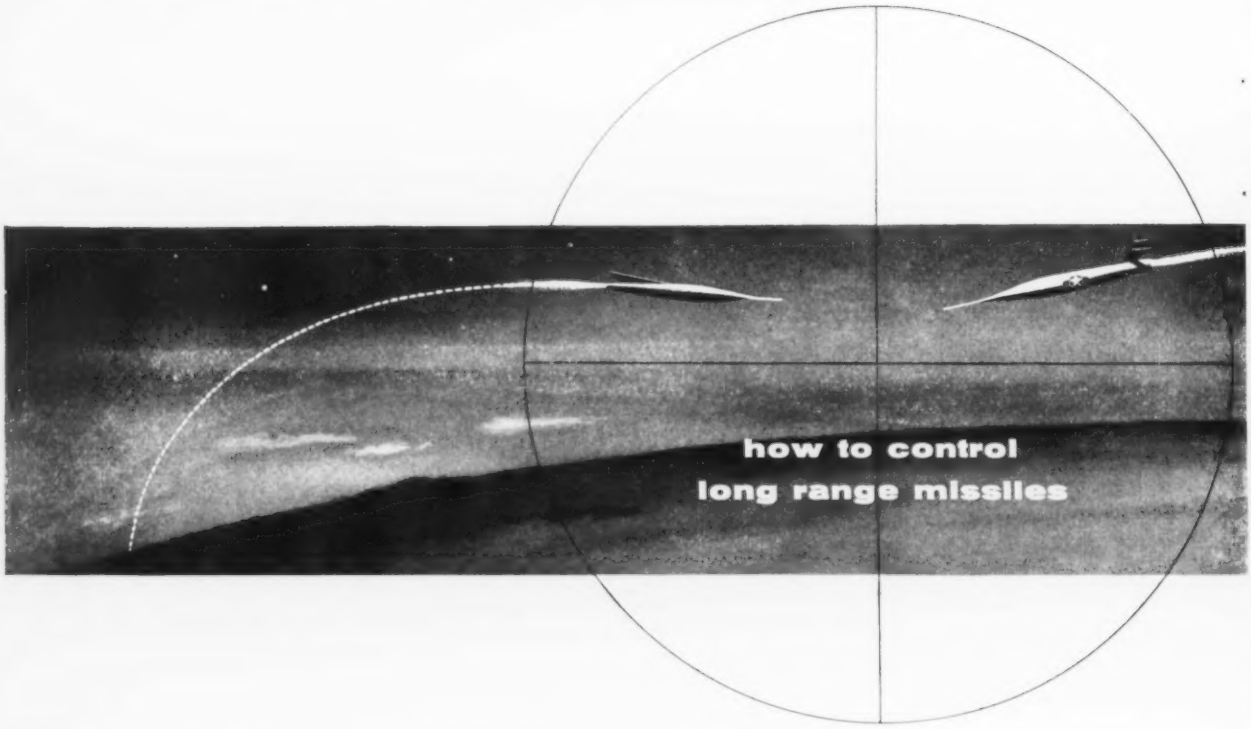
a new concept in gear accuracy!



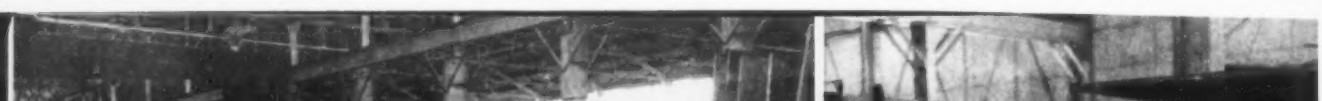
The control systems of modern missiles and aircraft are the "brains" which guide them to the target. Higher speeds, longer ranges and increased altitudes necessitate much more accurate control systems than in the past. One key to greater accuracy is gears made to previously unobtainable tolerances — gears which have an effective angular error of transmission of no more than ten seconds. And since speeds and ranges are increasing almost daily, the trend is toward closer and closer tolerances.

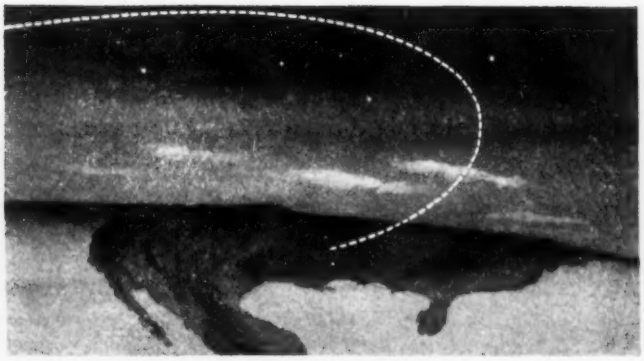
Barber-Colman engineers, working closely with Sperry Gyroscope engineers, have developed a machine and hobs which cut gears to closer tolerances than ever before produced. This machine is known as the "Ultracision" hobbing machine, and it cuts gears which will transmit uniform motion within ten seconds of arc or less, on a gear of 4" diameter. This machine is now hobbing gears *on a production basis* in the Sperry plant.

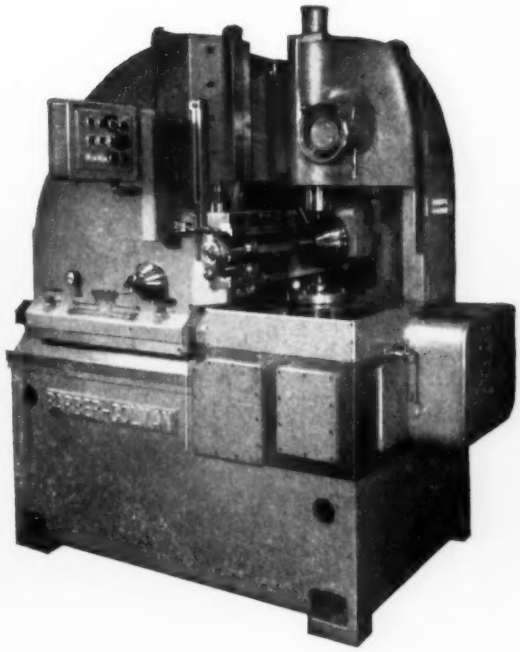
What does an error of ten seconds mean? It means that a plane flying 5000 miles would be within 400 yards of target at destination if dependent on gear accuracy alone in the navigation system. Five years ago, a one-mile error was good enough, but it is not today. More accurate gears are a primary requirement for these precision controls.

We have been asked to compare ten seconds of angular error to a given amount of total composite error. Such a comparison is not practical because they involve two entirely different methods of inspection. Theoretically, one function of a gear is to transmit uniform angular rotation within the required limits of accuracy. Therefore, the measurement of angular error provides a direct method for determining the rotational accuracy of the gear. Total composite error is the amount of center distance variation obtained by rolling a gear with a master gear or rack. This method provides a relative measure of gear accuracy.

In trying to obtain the very finest gears, Sperry engineers have developed a method of inspecting angular errors with fantastic accuracy. They can now measure angular error between any corresponding points on gear teeth profiles to an accuracy of one-half second of arc. This method measures the effect of spacing, lead and profile errors. Presently allowable errors cannot exceed ten seconds of true angular displacement at any diameter along the involute.







One of the most important features of the "Ultracision" hobbing machine is the accuracy of the relative rotation between the work spindle and the hob spindle. This is probably the most important single feature affecting accuracy of gears produced. This relative rotation was inspected dynamically by means of a theodolite and a camera. All other machine elements were made to extremely small tolerances, resulting in hobbed gears within the required tolerance of ten seconds.

Original hobs for this machine were made to one-half the tolerances of Class AA hobs. However, tests showed that hobs made to Barber-Colman Class AA tolerances were accurate enough for this application, and they are now being used on this machine. Although Class AA tolerances are used, the hobs are really more accurate than these tolerances would indicate because the diameter is over twice the diameter of a standard hob of an equivalent pitch.

Since Barber-Colman engineers have designed and built the hobbing machine which cuts the world's most accurate gears, they have the experience to recommend the machine to produce gears to your accuracy requirements. In most cases, standard-type machines will satisfy your requirements. On our most accurate standard-type machine, we guarantee that it will hob a 4″ PD, spur gear within .0002″ adjacent and .0004″ non-adjacent spacing error.

We invite you to submit your gear specifications and problems for analysis and recommendation by our engineers.

For more information about the "Ultracision" hobbing machine, write for descriptive literature.

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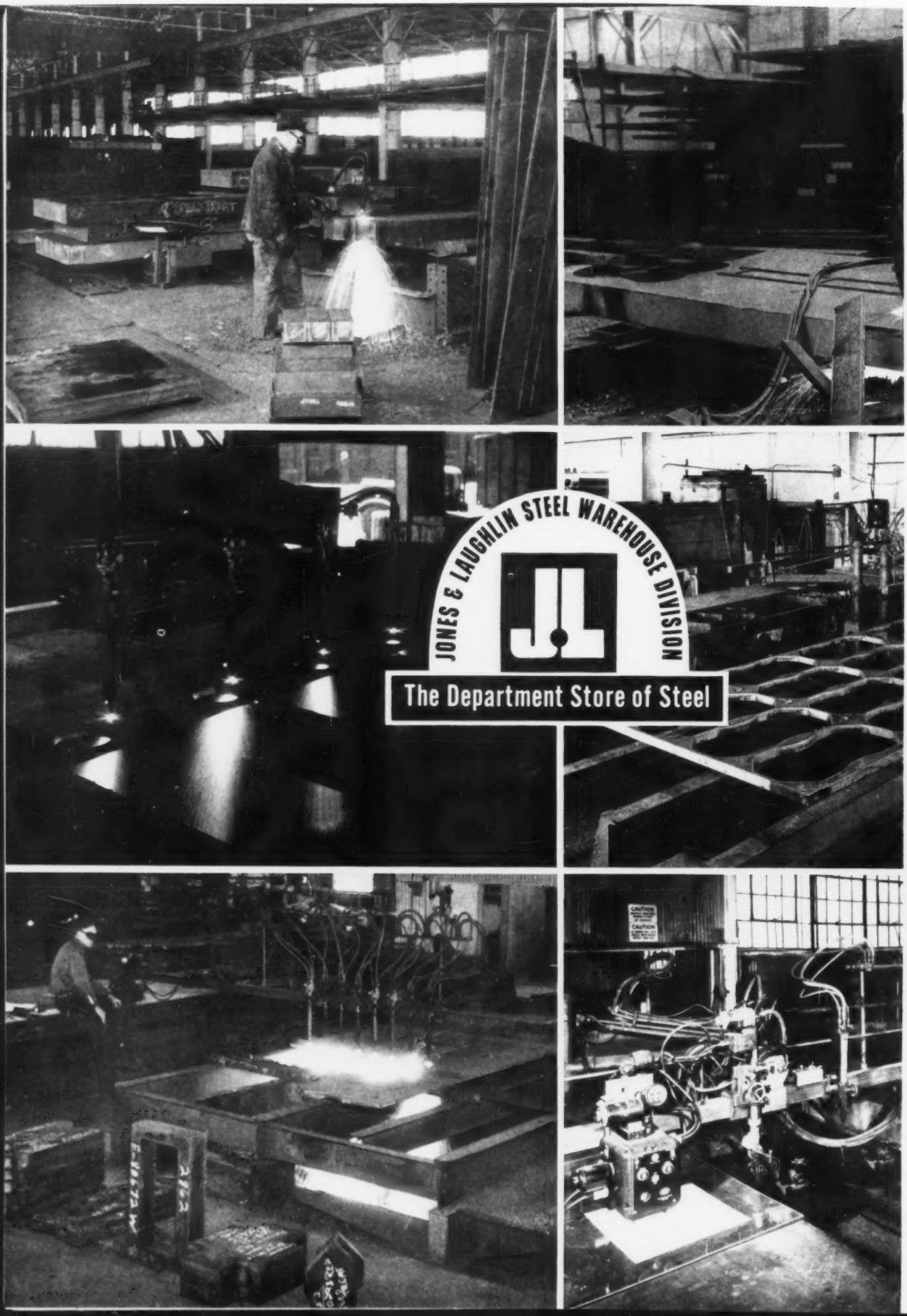
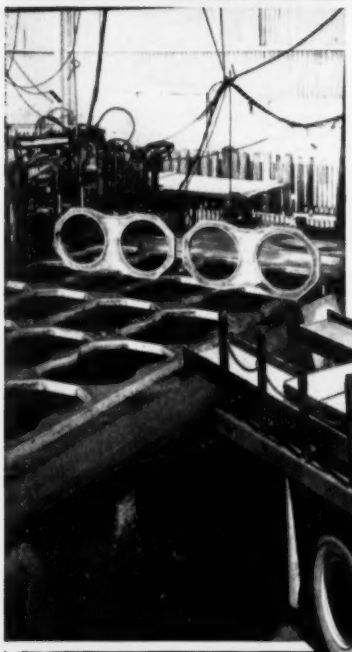
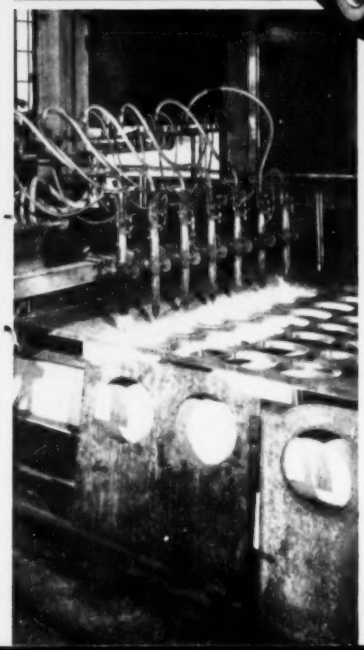

JONES & LAUGHLIN STEEL WAREHOUSE DIVISION
The Department Store of Steel





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● RESISTS IMPACT

● DOUBLE COMPENSATION RELIEVES OUTER PLY STRESSES

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"More Use per Dollar"

"More Use per Dollar"

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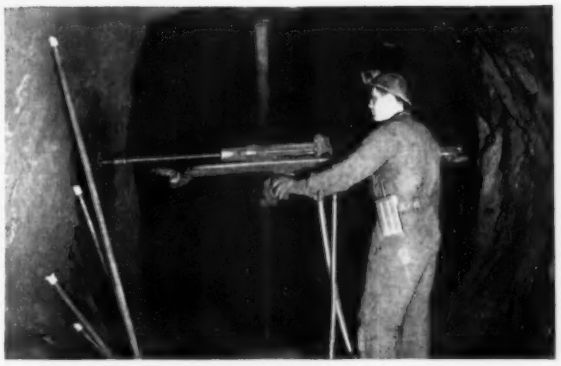

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How automobile engines were

HARPER'S WEEKLY

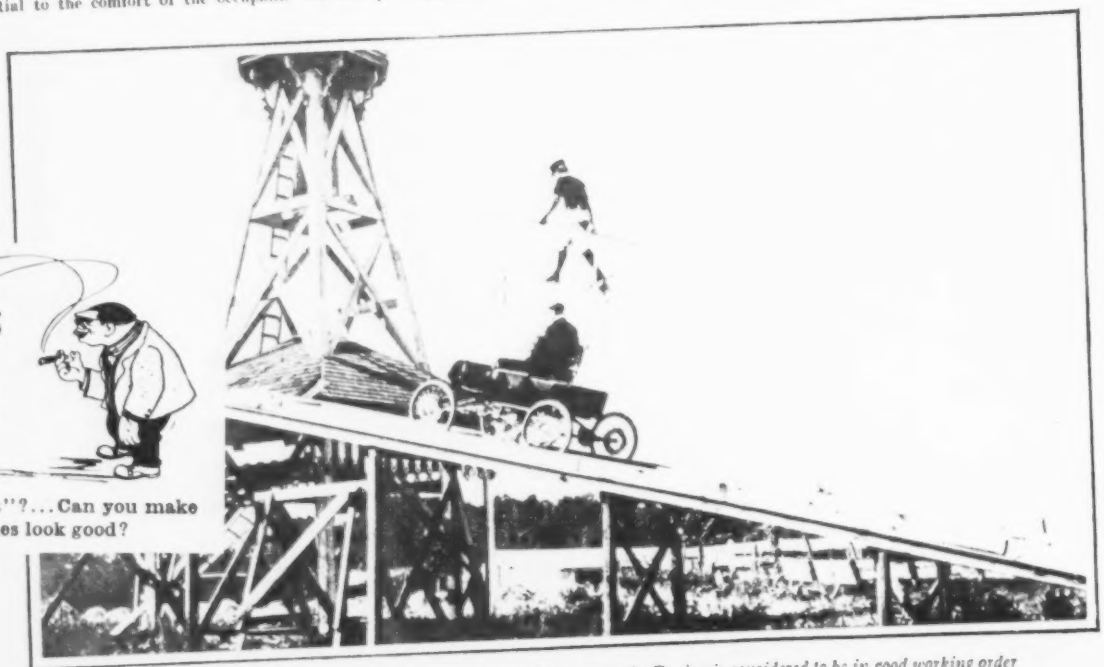
The page reproduced at left is from an August, 1903, issue of HARPER'S WEEKLY. It describes one of the first known attempts to measure vibration in automobile engines.

A Wire-rope Performer testing the Amount of Vibration of an Auto in Motion

A New Plan for Testing Autos

CONNECTED with an automobile factory in Michigan there is a very novel testing ground for automobiles. It includes a speeding-track which is perfectly level, and which is macadamized to give a smooth surface. In addition, an incline has been constructed which has a grade considerably steeper than the average hill encountered on the highway. Not only is the full power of the auto tested on the track, but its climbing capacity as well. One of the principal faults liable in a motor vehicle is the vibration caused by the irregularity of the engine when in motion. The absence of this vibration is essential to the comfort of the occupant. On this proving-ground experiments are made to determine the extent of vibration, as shown in the photographs. They assume the form of tight-rope performances. An "aerial artist" balances himself upon a bar supported by a framework which is attached to the body of the ordinary runabout. The runabout is operated at various rates of speed, both on the level track and on the incline. The amount of vibration of the engines is decided largely by the ability of the wire-walker to keep his balance while the auto is in motion. The feat of balancing on a wire while the auto is going up grade, however, calls for considerably more skill. When the trial is successful, it is due to the uniform movement of the engine.

An "aerial artist"?... Can you make our engines look good?



The Test on an Incline—if the Rope-walker can keep his Balance, the Engine is considered to be in good working order

balanced in 1903 B.D. *(Before DYNETRICS)*

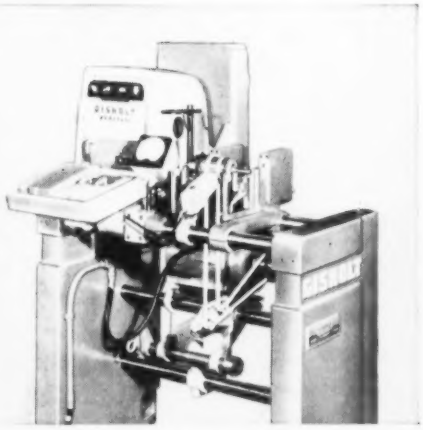
THIS BLAST FROM THE PAST... shows why it pays to keep up with the times!

A lot of water has run under the bridge since 1903! During that same year the first transcontinental "auto" trip was completed at New York; the Wright Brothers were making their first successful flights at Kitty Hawk.

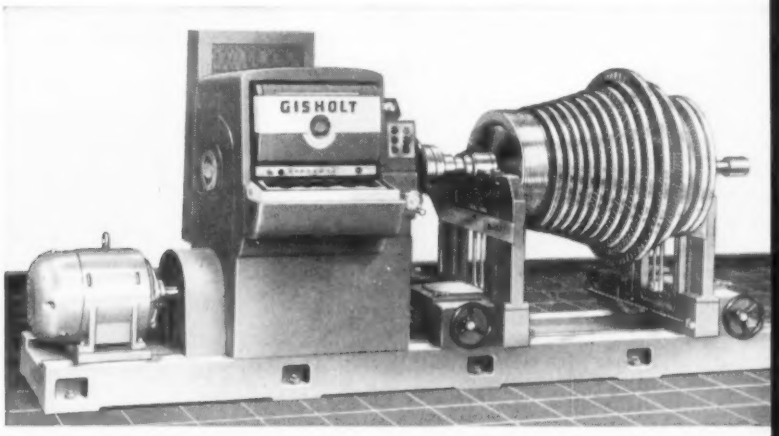
We've come a long way together in achieving today's high standards of manufacture and product performance. Gisholt worked with every industry, developed the equipment for balancing rotating parts weighing from a fraction of an ounce to many tons—for balancing parts a few at a time or by the thousands on a high-production basis.

How balancing is performed in 1957 A.D.
(After DYNETRICS)

Gisholt DYNETRIC Balancers use electrical networks to provide the necessary amplification for precise readings, eliminate guesswork by separating and isolating unbalance effects, for maximum accuracy and ease of correction on all types of work. No charts or graphs are needed; the amount of correction is indicated in units most practical for the work. Whether you balance parts from a fraction of an ounce to 150 tons, there's a Gisholt Balancer to give you the highest known standards at the lowest possible cost.



Gisholt 1S Balancer for parts up to 12" diam. weighing 1 to 30 lbs.



Gisholt 6U Balancer for parts up to 68" diam. weighing 500 to 10,000 lbs.

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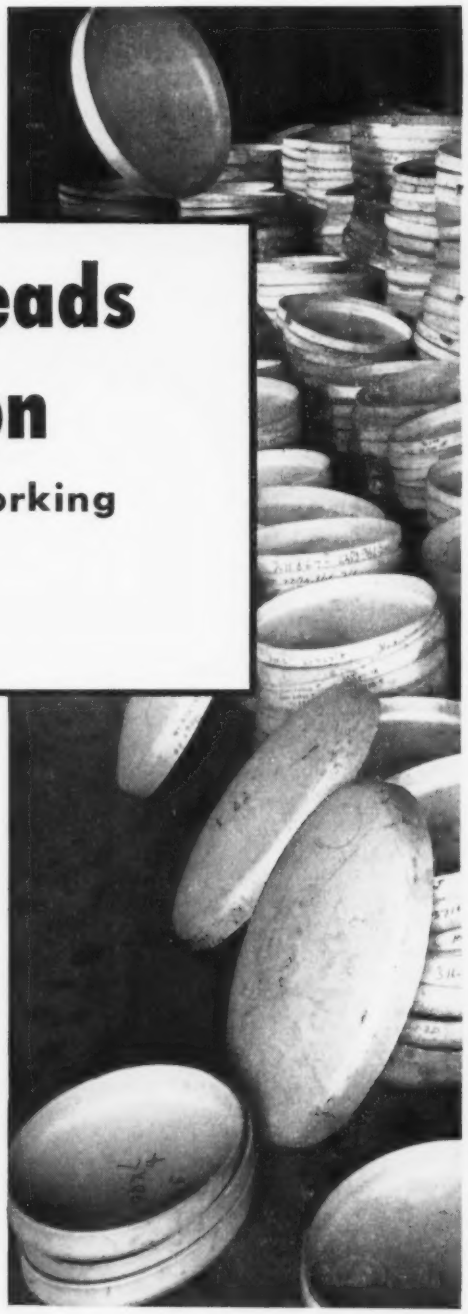

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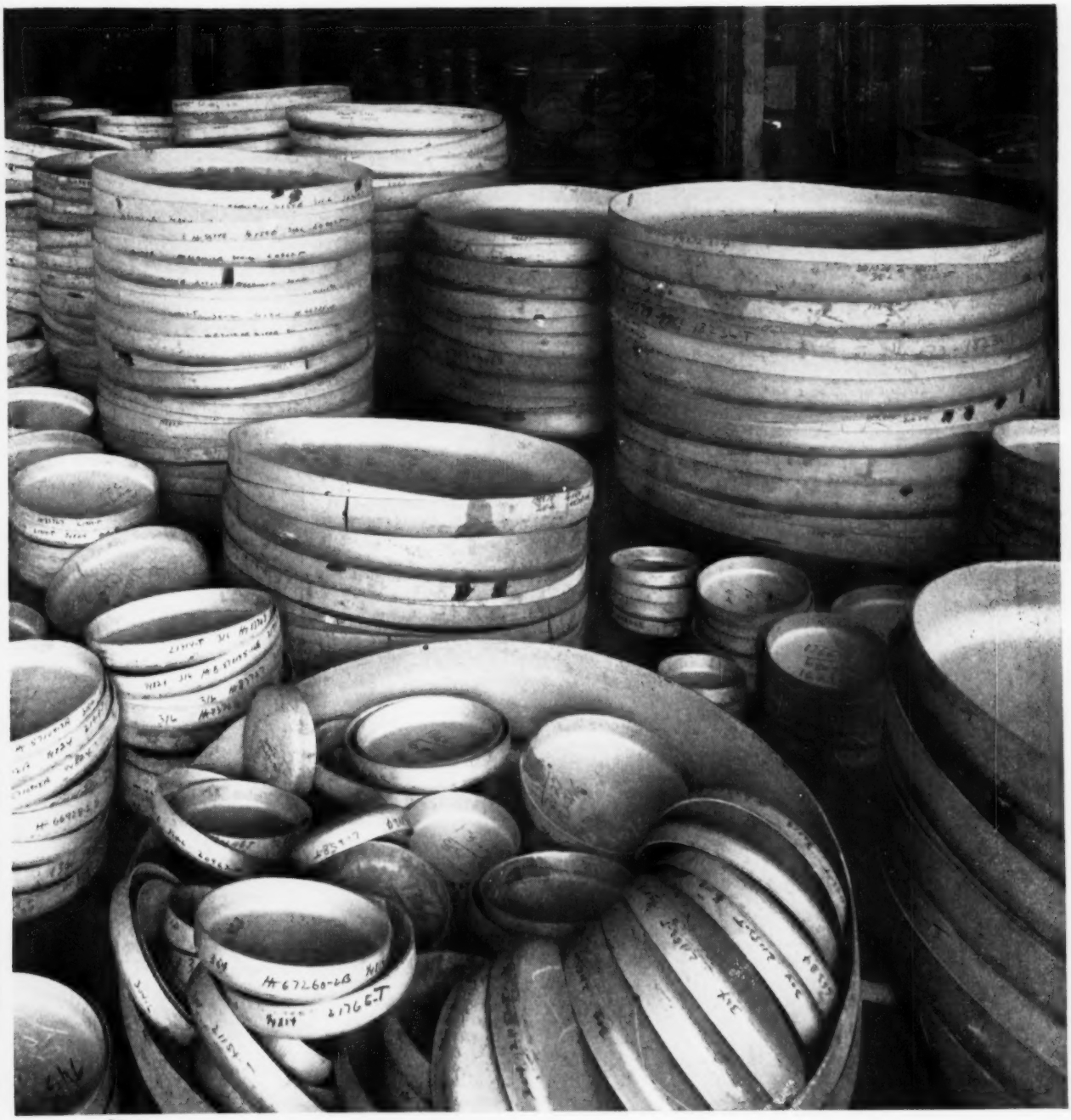

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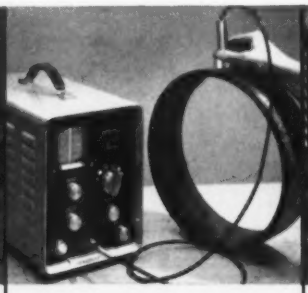

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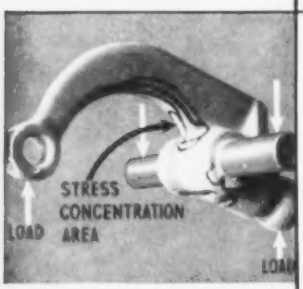

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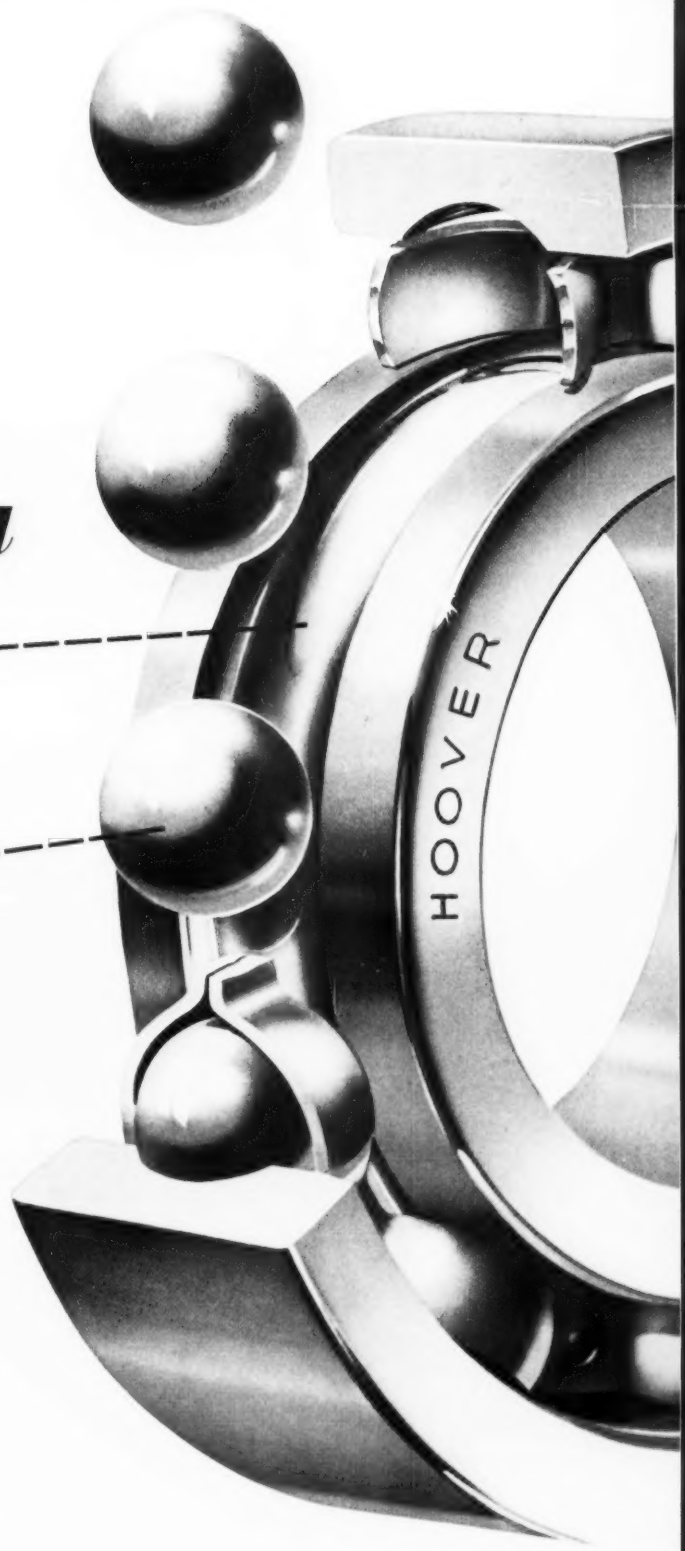

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which are not only ground, but also fully honed with a unique process developed and used only by Hoover. The result: super smooth, superbly finished raceways of microscopic accuracy and perfection.

Micro-Velvet Balls

made of the finest of selected high carbon chrome alloy steel, uniformly hardened throughout, then surface finished so perfectly that roundness and diameter are accurate within *millionths* of an inch! The gleaming surfaces are absolutely free of even the tiniest of defects.

Perfectly Matched

ball complements are fitted into perfectly matched raceways . . . a final quality step that pays off in maximum load capacity, hushed quietness and extra long life for which Hoover Ball Bearings are so well known. Bearing types available: single row, single and double shield, combination felt seal and shield, double row, cartridge, single and double contact seal.

Hoover Honed and *Micro-Velvet* are Hoover Trademarks

hoover

BALL AND BEARING COMPANY
ANN ARBOR, MICHIGAN

SALES OFFICE AND WAREHOUSE: 2020 SOUTH FIGUEROA, LOS ANGELES 7, CALIF.

WRITE FOR YOUR COPY OF THE HOOVER HANDI-BOOK OF ANTI-FRICTION BEARINGS.

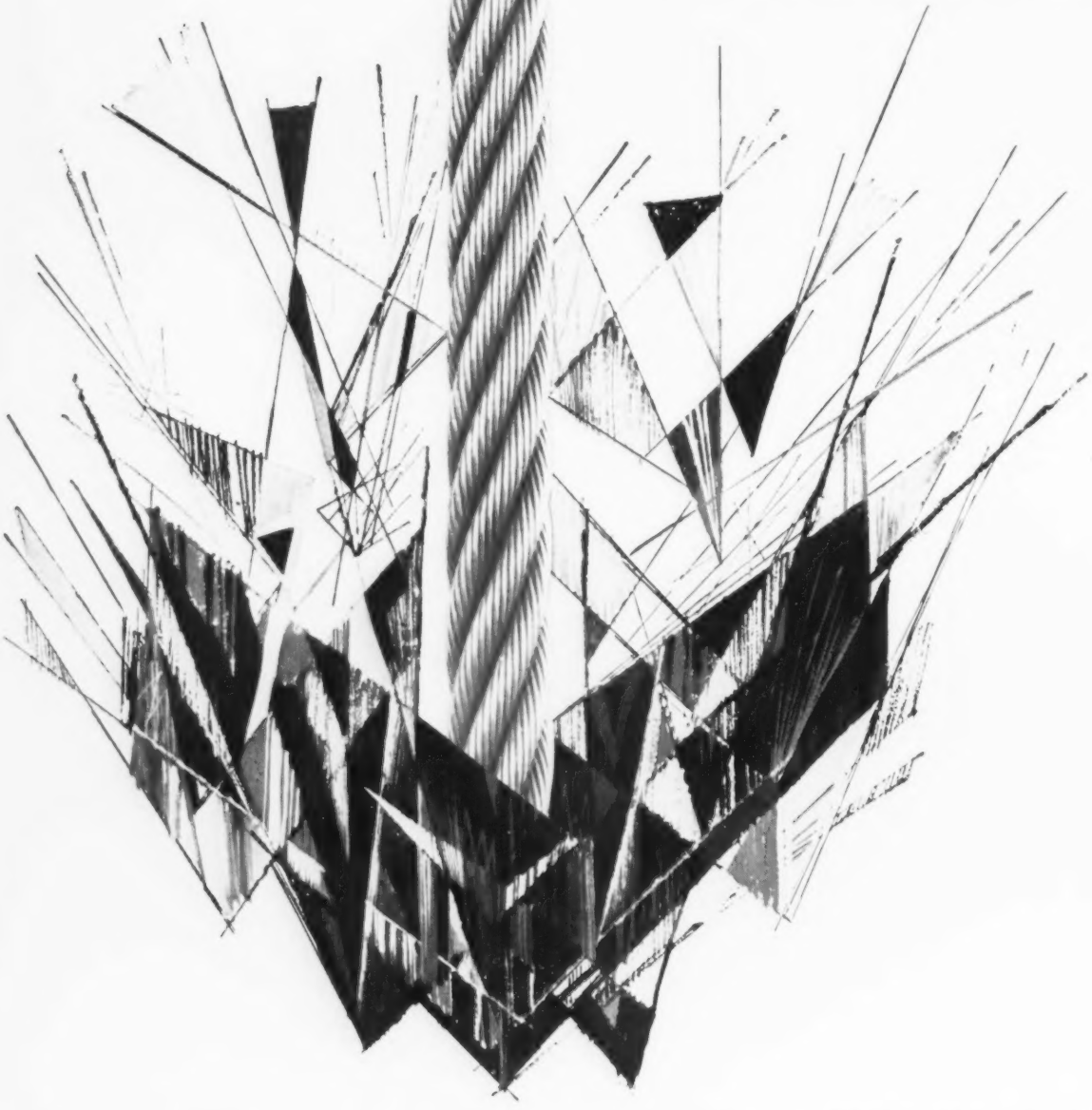
Keep accurate, concise information at your fingertips to help you select proper bearings and solve bearing problems.

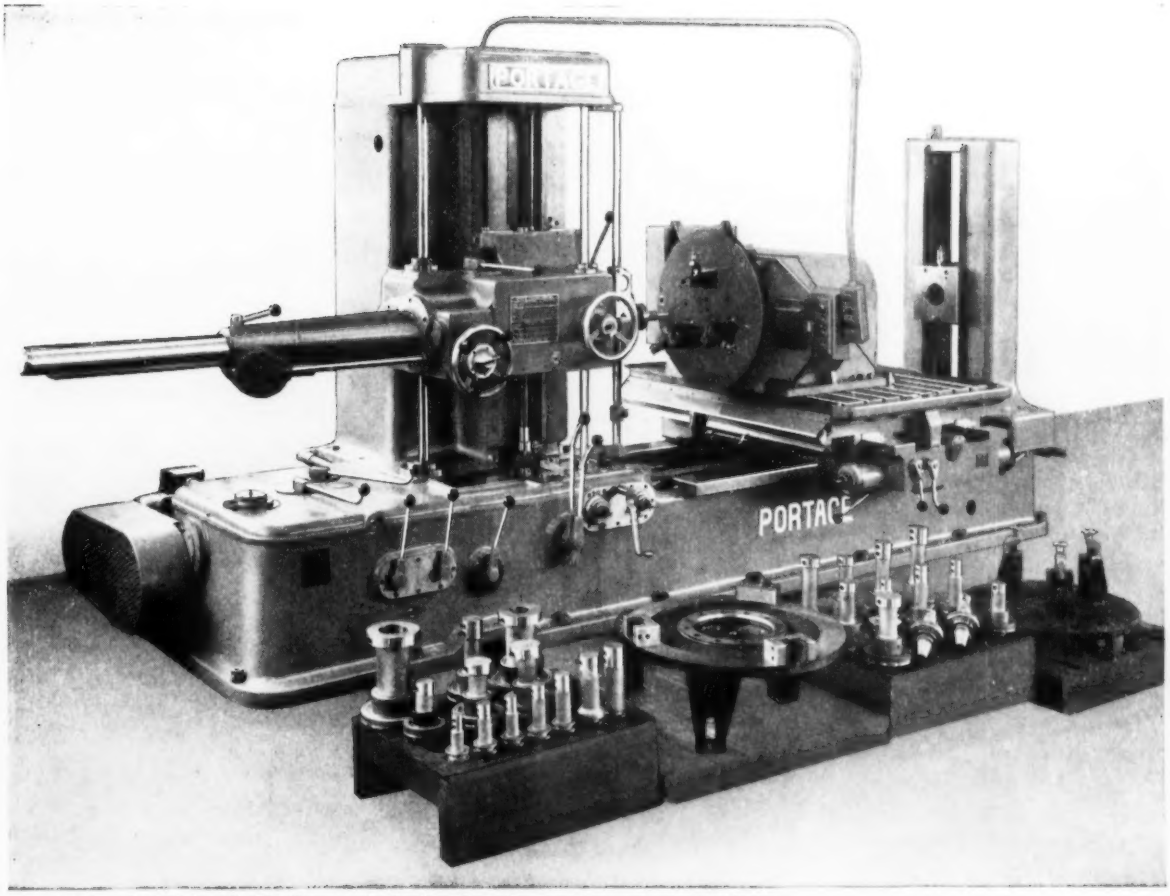
Roebling Royal Blue Wire Rope goes to any length to prove its **high strength!**

Every inch of every foot of Royal Blue is stronger than any rope you've ever used on *any* job. This on-the-job tenacity helps to make it the most widely and readily accepted rope in Roebling's history. It is but one of Royal Blue qualities that makes for its long service life—on any job you choose. For full details on Roebling Royal Blue Wire Rope talk to your distributor or write to Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, for your copy of *"Wire Rope Recommendations and Catalog."*

ROEBLING

Branch Offices in Principal Cities—Subsidiary of The Colorado Fuel and Iron Corporation





Tooling is P.D.Q. Quick Change including Sure-Bore micrometer cartridges.

PORTAGE builds "special tooling" on new 4 inch Horizontal Boring, Drilling and Milling Machine for...Westinghouse Gearing Division

Write for Catalog covering the 4 and 5 inch PORTAGE MILLS

This new 4 inch machine was built with a special vertical power indexing table. Unit can be set to index at any range with variables of 15 degrees between stations. Indexing accuracy can be held to less than 5 seconds of arc. Indexing and clamping are fully automatic with means for inching the table for setting-up purposes. This Westinghouse machine is just one example of the special purpose work being done for PORTAGE customers . . .

The Portage Machine Co. invites your inquiry for machines requiring special tooling . . . and remember . . . it costs less to buy, operate and maintain a PORTAGE.

THE Portage MACHINE CO.

1035 Sweitzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

The New One. Battery No. 9, installed by Koppers last year, consists of 41 Koppers-Becker underjet ovens capable of producing 700 tons of furnace coke a day.

Below, ovens are pushed on a fixed 17-hour schedule.

294 KOPPERS COKE

THE NEW NO. 9 COKE BATTERY at Weirton Steel Company went into operation in November, 1956. These 41 Koppers-Becker underjet ovens and five previous batteries, all designed and built by Koppers, give Weirton a total coke-producing capacity of 1,900,000 tons per year.

There are good reasons why Weirton Steel Company, a division of National Steel Corporation, has always called on Koppers for coke plant design and construction. Koppers has been improving coke ovens since 1907—reducing operating costs, increasing the yield of chemicals, improving control of heating. These improvements can be measured in dollars—dollars saved where Koppers ovens are installed.

No Decarbonizing Equipment

Koppers-Becker underjet ovens eliminate the need for decarbonizing equipment because waste gas is recirculated to inhibit carbon formation in flues and in gas ducts. This also cuts fuel gas consumption.

KOPPERS

. . . and another new battery makes

OVENS AT WEIRTON STEEL!

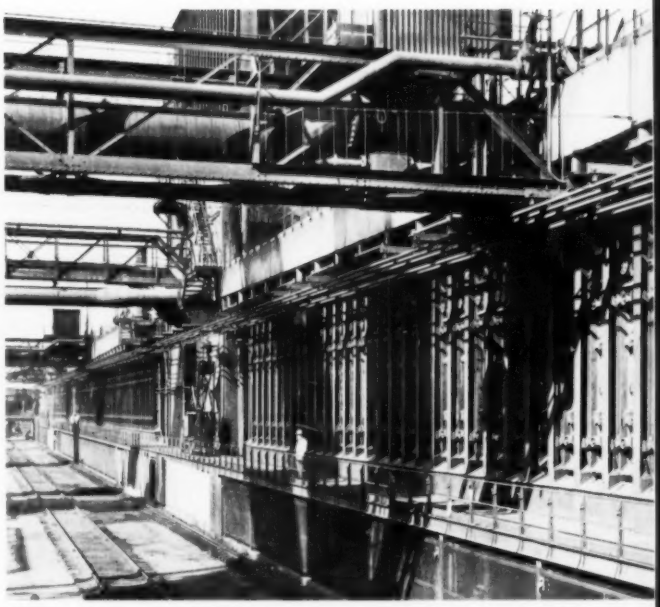
Koppers ovens provide unusually even coke temperature from top to bottom and from door to door. The result is extremely uniform coke.

Plant Layout and Design

Koppers research and engineering staffs can tailor designs and plant layouts to your needs . . . can help you with all problems connected with coal preparation and handling, coal-chemical recovery, light-oil refining and purification, phenol recovery, and other processes associated with coke plant operations.

• • •

Call Koppers for *any* type of steel-mill installation. Engineers from the Coke Plant Department, Freyn Department, and Chemical Department are prepared to work with you during all phases of plant construction, expansion, or rebuilding. Koppers Company, Inc., Coke Plant Department, Pittsburgh 19, Pennsylvania.

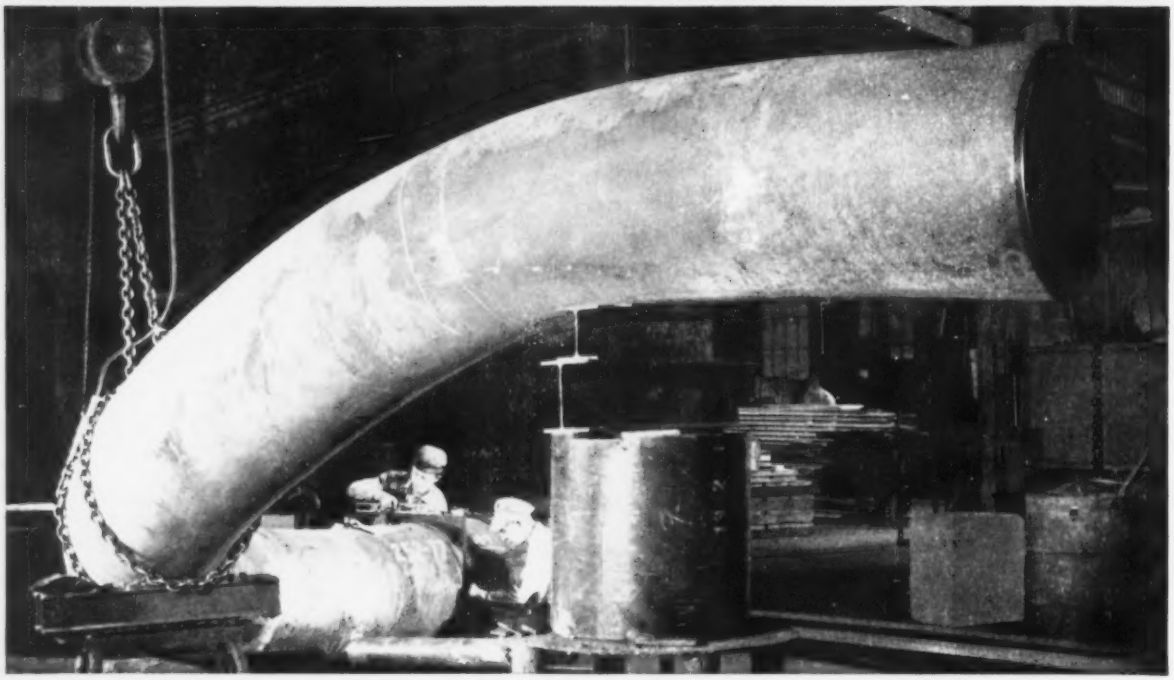


Weirton Ovens are 100% Koppers. Every coke oven built for Weirton Steel Company has been built by Koppers. In this photo are batteries 5, 6 and 8 . . . with 147 Koppers ovens in line.

KOPPERS

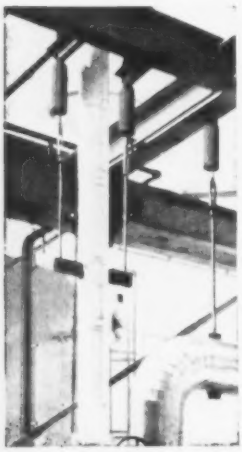
ENGINEERING AND CONSTRUCTION

BLAW-KNOX has what it takes—to provide these products and services



Large chrome moly pipe being readied for shipment to new generating station. Making a right angle bend followed by a 24 degree, 18 foot bend in this heavy 27½ inch chrome moly pipe required all the skill and modern facilities of the Blaw-Knox power piping shop. Before shipment, piping is heat-treated and ultrasonically tested with a radar-type device for detection of any defects.

A new Blaw-Knox "6 x 6" Flexibility Matrix Method of computing stresses in power piping systems is now available to consulting engineers, companies, and individuals responsible for the design of power piping systems. By the use of an electronic computer this method cuts calculating time from months to a day; assures full accuracy to six significant figures; and has no limitations on the complexity of the system. Write for further information about our new "6 x 6" Flexibility Matrix Method.



Two-way control over movement of piping is provided by Blaw-Knox functional spring hangers with the patented internal swivel action—shown in this modern outdoor generating station. Our experienced engineers are available to both design and make recommendations for your hanger requirements. To get full information, write for Catalog No. 54.

Each year serious fire strikes one out of every seven manufacturing firms in this country. Be safe. Let a Blaw-Knox fire-protection engineer study your needs and explain how you can pay for the system on our lease or deferred payment plan. To get more information send for Bulletin No. 2426 "Fire Can Destroy Your Business."

BLAW-KNOX

BLAW-KNOX COMPANY

Power Piping and Sprinkler Division

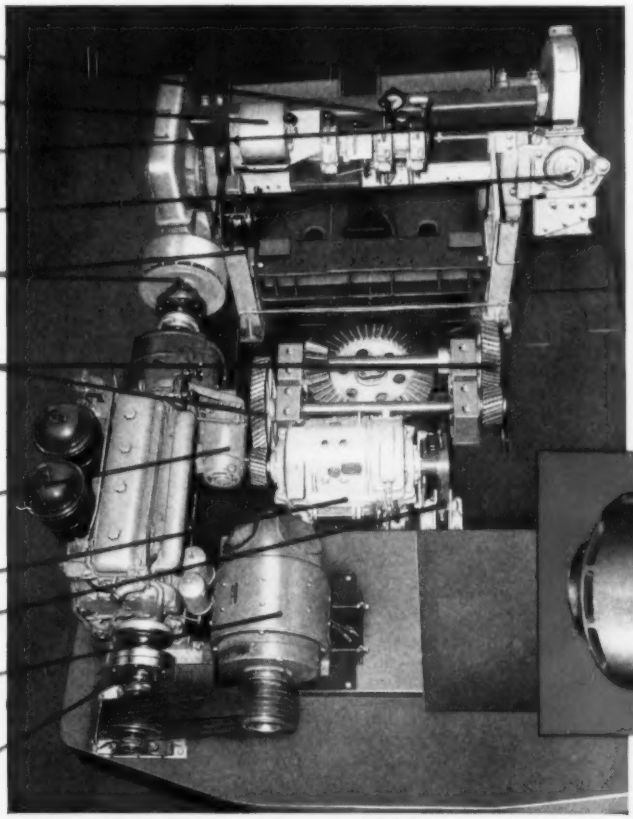
829 Beaver Avenue • Pittsburgh 33, Pennsylvania

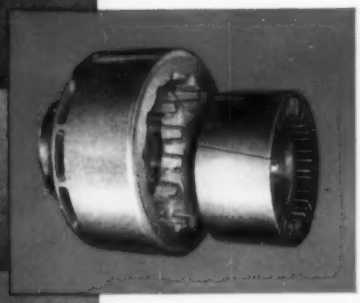
Complete facilities for prefabrication and erection of piping systems for all pressures and temperatures . . . complete line of standard and custom-engineered pipe hangers, supports and vibration eliminators . . . complete line of automatic sprinkler systems for standard and special hazards

HOW THE ELECTRIC ROTATING MECHANISM IN I. B. LOCOMOTIVE CRANES increases operating speed and efficiency

Wherever crane rotation is unusually severe (magnet and bucket operations), an electric rotation unit (optional at extra cost) can be supplied with Industrial Brownhoist Cranes. The savings in maintenance and the greater efficiency plus the elimination of friction clutches offset the cost in a short time. The generator in the electric rotating motor is large enough to supply power for magnet service, and the complete rotation mechanism is easily accessible, being mounted on the top of the rotation bed. Reversing the flow of current through the motor, quickly and smoothly reverses the direction of rotation. • The carbody, trucks, monitor-type cab, and machinery arrangement of I. B. equipment have been equally well engineered. Write for Catalog No. 548 for complete information.

- PUSH BUTTON MAGNET CONTROL
- ROTATING CONTROLLER
- SAFE WORM DRIVEN BOOM HOIST
- AUTOMATIC BOOM HOIST BRAKE
- DYNAMIC CLUTCH AND CONTROLLER
- ELECTRIC ROTATION GEAR REDUCTION UNITS MOUNTED ON ANTI-FRICTION BEARINGS (HERE SHOWN WITH OIL CASES REMOVED)
- 1500-WATT BATTERY GENERATOR FOR STARTING AND NIGHT LIGHTING EQUIPMENT
- ROTATING MOTOR
- ROTATING BRAKE
- ROTATING AND MAGNET GENERATOR SUPPLIES CONSTANT VOLTAGE
- FLEXIBLE COUPLING





THE DYNAMATIC CLUTCH between the engine and crane machinery is a driven rotor within a magnetic field assembly . . . mounted on friction bearings. A 32-step control gives accurate power response, eliminates torsional impulse and vibration and allows positive control in handling loads.

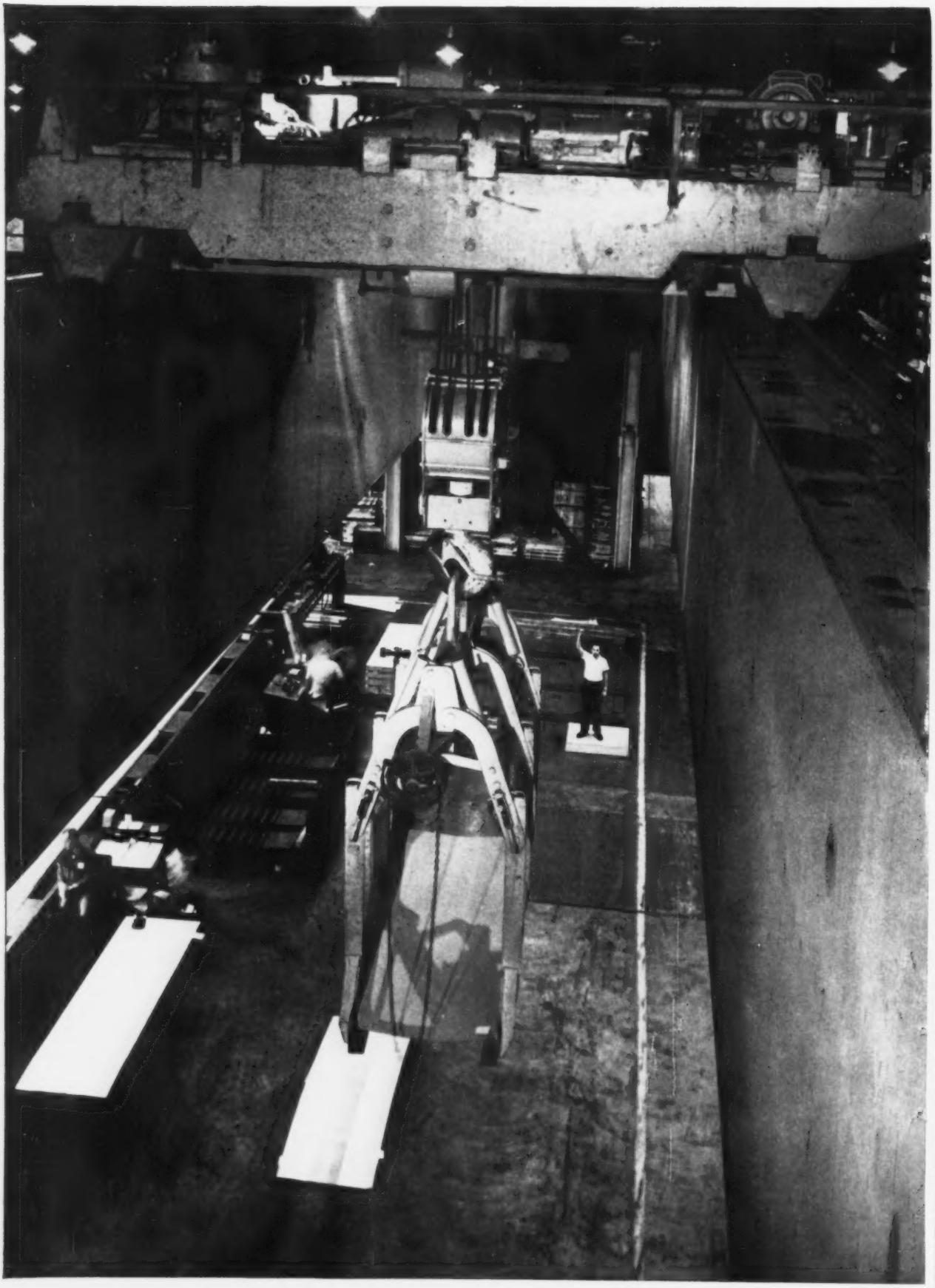
194

BROWNHOIST

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

SUBSIDIARY OF Penn-Texas

INDUSTRIAL BROWNHOIST CORPORATION
BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago; Montreal, Canada
AGENCIES: Detroit, Birmingham, Houston, Los Angeles.



NO DOWNTIME ... NO LOSS IN PRODUCTION

reports Weirton Steel Co.* of its 30-ton crane equipped with Westinghouse motors, brakes and control

Full operating efficiency 16 hours per day 6 days a week . . . that's the kind of dependable service Weirton Steel's zinc plating mill at Weirton, West Virginia has received from this 30-ton crane equipped with Westinghouse motors and control.

Used to move 6,000-lb. bundles of zinc plates in a synchronized timing operation from the shear line to the packaging area, not a single breakdown has ever occurred . . . no production has been lost.

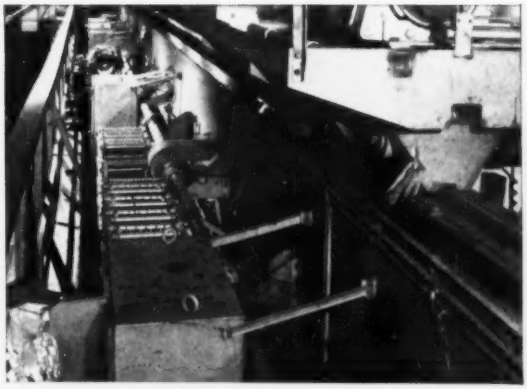
Rugged, compact, and easy to maintain, Westinghouse Silicone-insulated Hevi-Duty Mill Motors allow quick starts, stops, reverses . . . permit slow, smooth operation at no load and at full load. With Westinghouse controls, each unit in the crane system —hoist, trolley, and bridge—moves in the right direction and at the speed necessary for controlled coordination with overall plant operation. Exclusive Westinghouse self-adjusting dc magnetic brakes assure smooth, positive braking with any load—light or heavy.

When you are considering new or replacement crane drives, look to Westinghouse for the exact system required for your particular operation. For complete information, contact your Westinghouse sales engineer, or write Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-22064

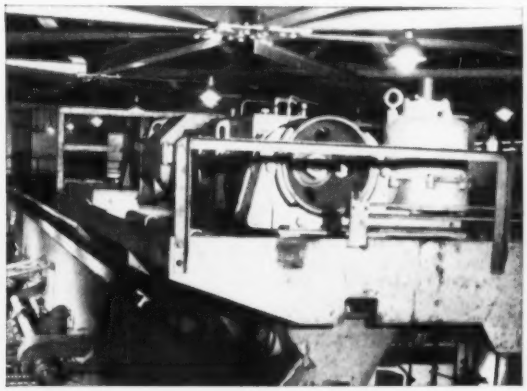
*Division of National Steel Corp.

YOU CAN BE SURE... IF IT'S

Westinghouse

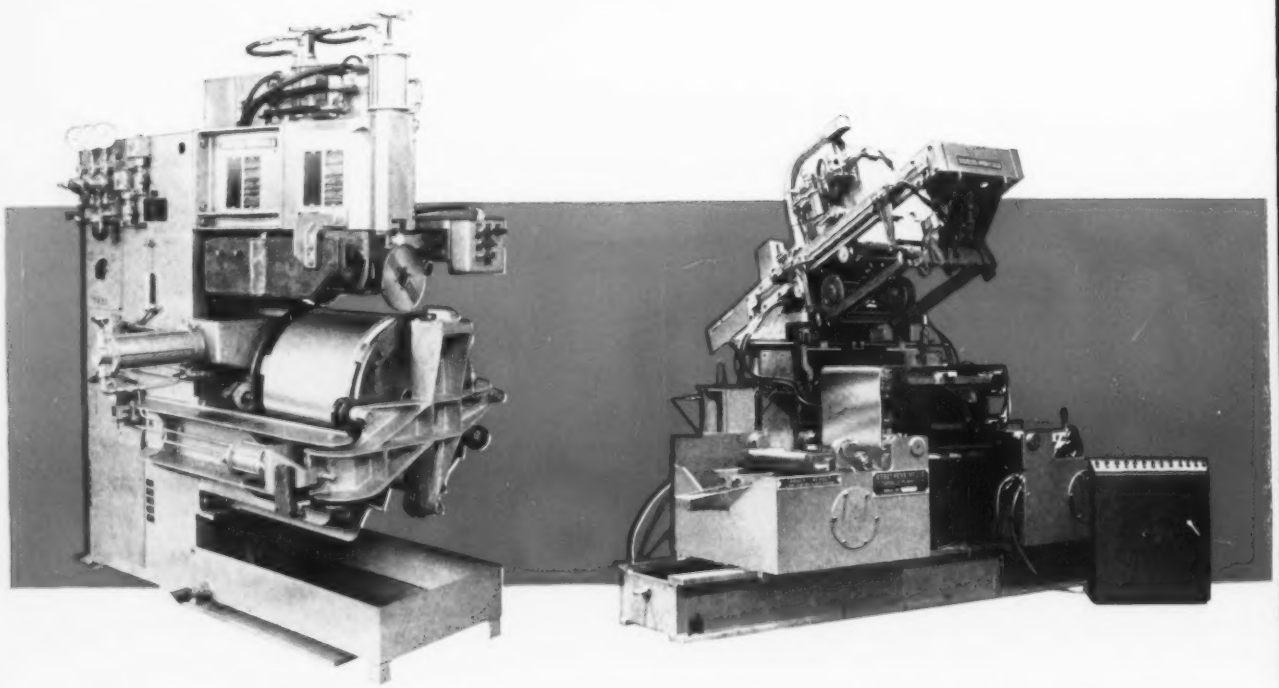


Westinghouse class 9635 and 9605 crane controls are specifically designed for applications requiring heavy-duty electrical equipment. The combination of a well-engineered unit and rugged components assures long dependable operating life.



Type SA dc magnetic brakes by Westinghouse are completely self-adjusting . . . reduce lining wear . . . never need future adjustments. With Westinghouse Silicone-insulated MC 600 mill motors, higher maximum safe speeds are obtained.

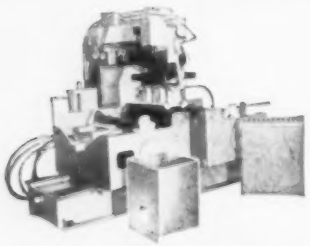
TAYLOR-WINFIELD
Metal Forming



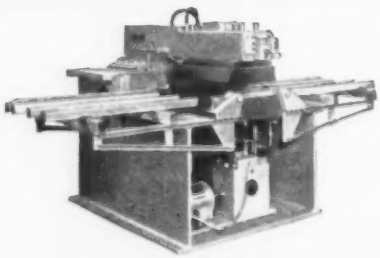
Taylor-Winfield, leading electric welder manufacturer . . .

. . . experienced in design and fabrication of combination bender-welder equipment . . .

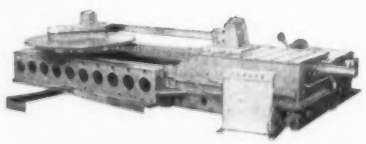
Taylor-Winfield Offers New



TANGENT BENDERS



FOLDING MACHINES



ROLLER TABLE BENDING MACHINES

for the Automation Lines

acquires . . .
Machinery lines of Struthers Wells

. . . acquires leading line of metal forming and work-handling equipment from Struthers-Wells Corp.

The Taylor-Winfield Corporation, leading electric welder manufacturer, has purchased the exclusive lines of metal-forming and work-handling machinery formerly built by the Struthers-Wells Corporation.

Taylor-Winfield tangent benders, roller table and tumble die benders, punching and notching machines, folding machines, brake presses, destackers, pipe benders and related dies are now offered to automotive, home appliance and other sheet metal product manufacturers. One fully responsible builder now can supply a coordinated production line—handling coil or sheet to the final formed and welded product.

Struthers-Wells Corporation has discontinued the design, manufacture and sale of this machinery. Taylor-Winfield will provide replacement, repair and redesign service for metal-forming and work-handling machinery manufactured previously by Struthers-Wells. A team of Struthers-Wells machinery specialists, including management and other key personnel, have joined Taylor-Winfield.

Contact one of the offices below for prompt, specialized attention to your welding and metal-working production problems.

The **TAYLOR·WINFIELD** *Corporation*

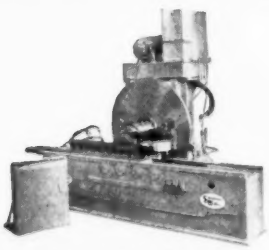
WARREN, OHIO

ELECTRIC RESISTANCE AND ARC WELDING MACHINES
METAL FORMING AND WORK-HANDLING EQUIPMENT

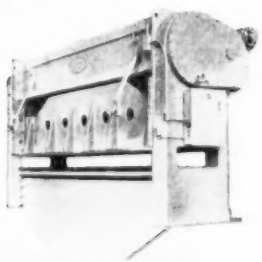
Sales and Service

CHARLOTTE • CHATTANOOGA • CHICAGO • CLEVELAND • DALLAS
DAYTON • DENVER • DETROIT • LOS ANGELES • PHILADELPHIA
PORTLAND, OREGON • ST. LOUIS • STAMFORD
OAKVILLE AND WINDSOR, ONTARIO

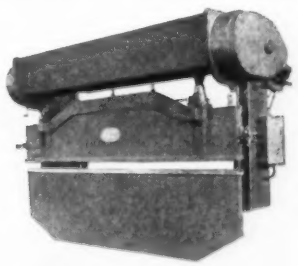
Products of Modern Industry



TUMBLE DIE BENDING MACHINES



PUNCHING AND NOTCHING MACHINES

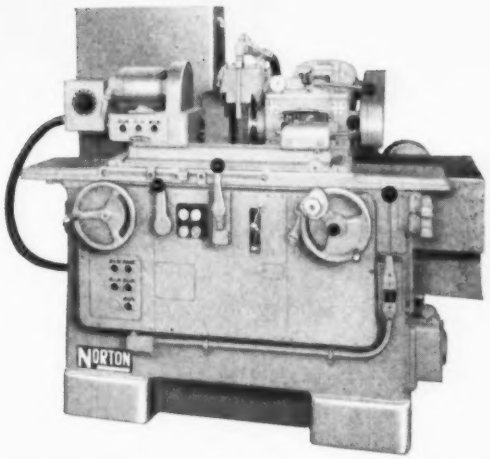


BRAKE PRESSES

HIGH PRECISION PLUS HIGH PRODUCTION. Long-lasting accuracy is built into the 4" x 18" Type CTU cylindrical grinder — together with many Norton "Touch of Gold" features that reduce operators' duties and speed production. Remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost.

Norton 4" x 18" Type CTU cylindrical grinder

makes small parts pay off big



Here's a cylindrical grinder you can get as either a Plain Machine for traverse work, or as a Semiautomatic for plunge operations.

Either way you get faster, more accurate, more profitable grinding of a wide variety of small parts. Because either way the 4" Type CTU's Norton-developed features bring a new ease of operation for your men — and a new high in production quality and quantity for *you*.

For example, there's the extremely rugged wheel spindle unit that assures enduring precision in jobs ranging from heavy stock removal to fine finishing. Then there are optional profit-boosting extras like the new SWIVALIGN Dual Electric Indicator for measuring swivel table adjustment, and an Automatic Wheel Truing Device.

Get All the Facts

on how this fast, accurate grinder can add the profit-boosting "Touch of Gold" to your grinding operations. See your Norton Representative, or write direct for Catalog No. 531. And ask about the Norton Lease and Purchase Financing Plans that enable you to modernize while conserving your capital. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

To Economize, Modernize with **NEW**

NORTON

GRINDERS and LAPPERS

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives, Grinding Wheels, Grinding Machines, Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives, Sharpening Stones, Behr-cat Tapes

District Offices: Worcester • Hartford • New York Area Teterboro, New Jersey • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5, Ontario

Cars move... production flows... costs drop with Trackmobile

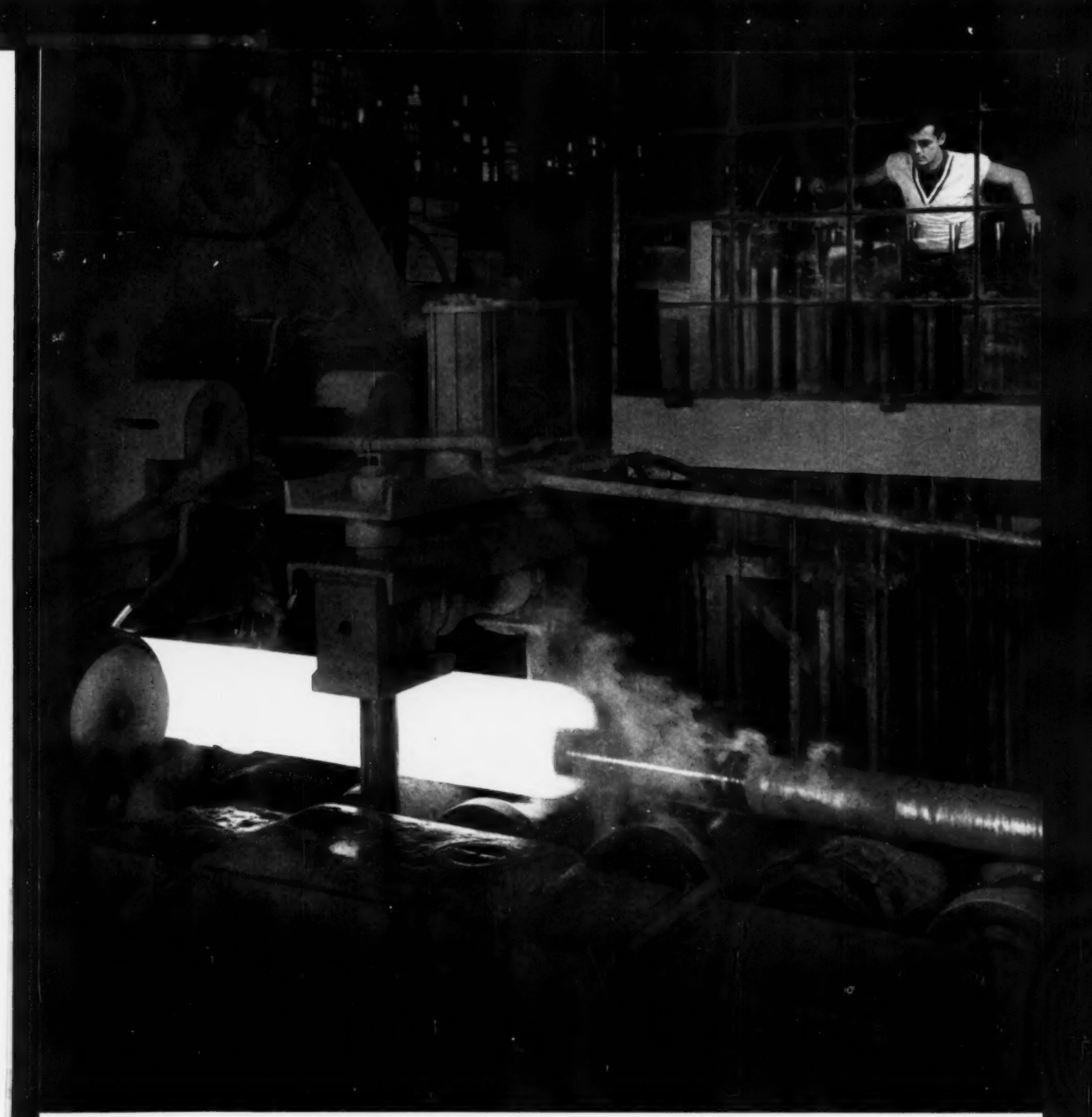
Wherever you find Trackmobile, you find things moving. Material flows without a hitch, products progress smoothly through the plant, freight cars are spotted and switched without delay. Inland Steel (above), Westinghouse, International Harvester, and hundreds of other companies use it to save time and money.

Trackmobile is the handiest machine ever invented for switching freight cars. It runs on rail wheels or road wheels—steel to rubber takes only seconds—and it can cross from track to track at any point. It's husky, too . . . built for 24-hour duty . . . pulls several loaded cars on grade or level. Trackmobile pays off with as few as three car moves a day. Get the facts Write now for Bulletin T-122. *Whiting Corporation 15601 Lathrop Ave., Harvey, Illinois.*

WHITING

TRACKMOBILE

MANUFACTURERS OF CRANES, TRAMBEAM HANDLING SYSTEMS, FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT



Bright spot in steel

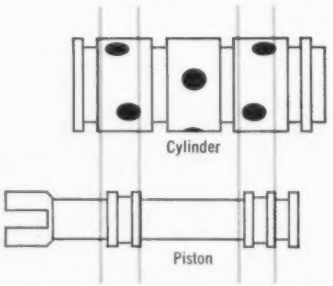
Here is America's only rotary forging seamless tube mill at Barium's Phoenix Iron & Steel Company. The unusual feature of this completely mechanized mill is that it can commercially custom-roll small, as well as large, quantities of specialty sized seamless tubing. The demand for this special heavy wall pipe and tubing is growing due to a continuing trend to higher pressures and temperatures in power plants, chemical and oil processing and other industrial applications. Here is a working example of Barium's basic management philosophy: specializing in basic steel products required in America's growth . . . plate, structural shapes, heavy wall seamless pipe and tubing.

BARIUM STEEL
CORPORATION

BARIUM STEEL CORPORATION, 25 BROAD STREET, NEW YORK 4, N. Y.

7-1

MATCH PISTON LANDS TO CYLINDER PORTS PRECISELY WITH SHEFFIELD'S MICRO-FORM GRINDER



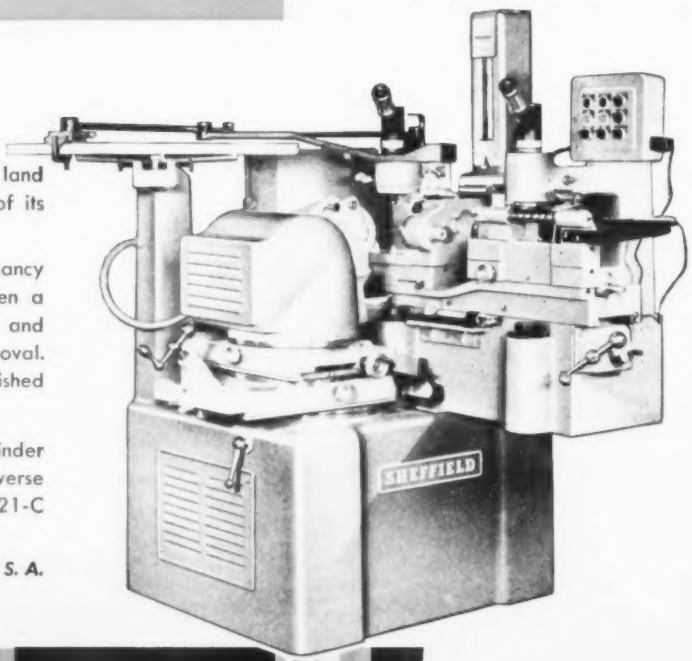
This servo cylinder and piston are typical of the very precisely machined hydraulic components in aircraft propeller and flight control systems.

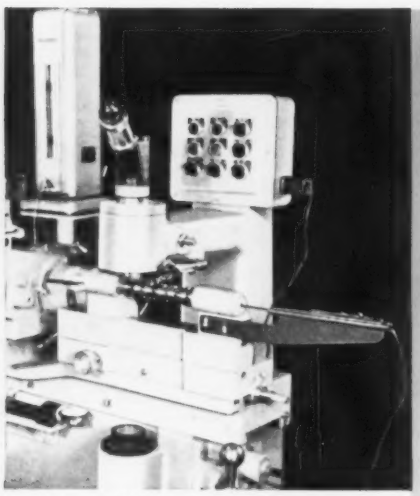
With the actual cylinder as a reference, each piston land is individually ground to match the inside edge of its respective cylinder port.

If a flow test then reveals the slightest discrepancy between land and port edge, the piston is given a finishing touch, using a Sheffield Precisionaire and Airetest Indicator to show progress in stock removal. Thus, the correction of the land face can be accomplished to within ± .000010".

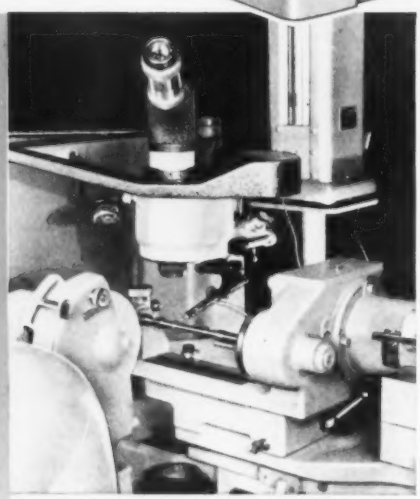
This is typical of the wide range of Micro-Form Grinder applications in duplicating precision profiles or reverse profiles from a master. Write for Bulletin MFG-121-C to Dept. 8.

THE SHEFFIELD CORPORATION, DAYTON 1, OHIO, U. S. A.





Cylinder under observation on auxiliary table.



Airetest Indicator shows stock removal in final correction.

the **SHEFFIELD** *corporation*

manufacture and measurement for mankind

OF BENDIX AVIATION CORPORATION

7560

CO_2 MAGS
WELDING PROCESS GIVES GREATER SPEEDS AND PENETRATION
(and costs far less, too)

The Chicago Steel Tank Company, division of U. S. Industries, Inc., was faced with a problem involving thousands of 1" carbon steel plug welds in several steam jacketed vessels.

After experimenting with other methods, they found that the CO_2 MAGS process solved the problem.

This process gave increased metal deposition rates and greater penetration due to the agitating type of arc that is characteristic of CO_2 welding. At the same time, the use of CO_2 MAGS process gave increased operator flexibility, minimized the need for rework and greatly improved the appearance of the welds.

WELDING GRADE CO_2 COSTS ONLY 1½¢ PER CU. FT.

CO_2 Metal Arc Gas Shielded Welding saves approximately 7¢ on every cubic foot of gas you use. This brings the advantages of shielded gas welding to even the most limited budget applications. As Chicago Steel Tank proved to their own satisfaction, MAGS process gives welds that are equal, *or superior*, to welds made with argon or helium.

For best results with CO_2 MAGS welding, do what Chicago Steel Tank Company does . . . use RED DIAMOND Welding Grade CO_2. This CO_2 is specifically developed for gas shielded welding. Furnished in distinctively marked 50 lb. (435 cu. ft.) cylinders. See what CO_2 MAGS welding can do for you—mail the coupon below.

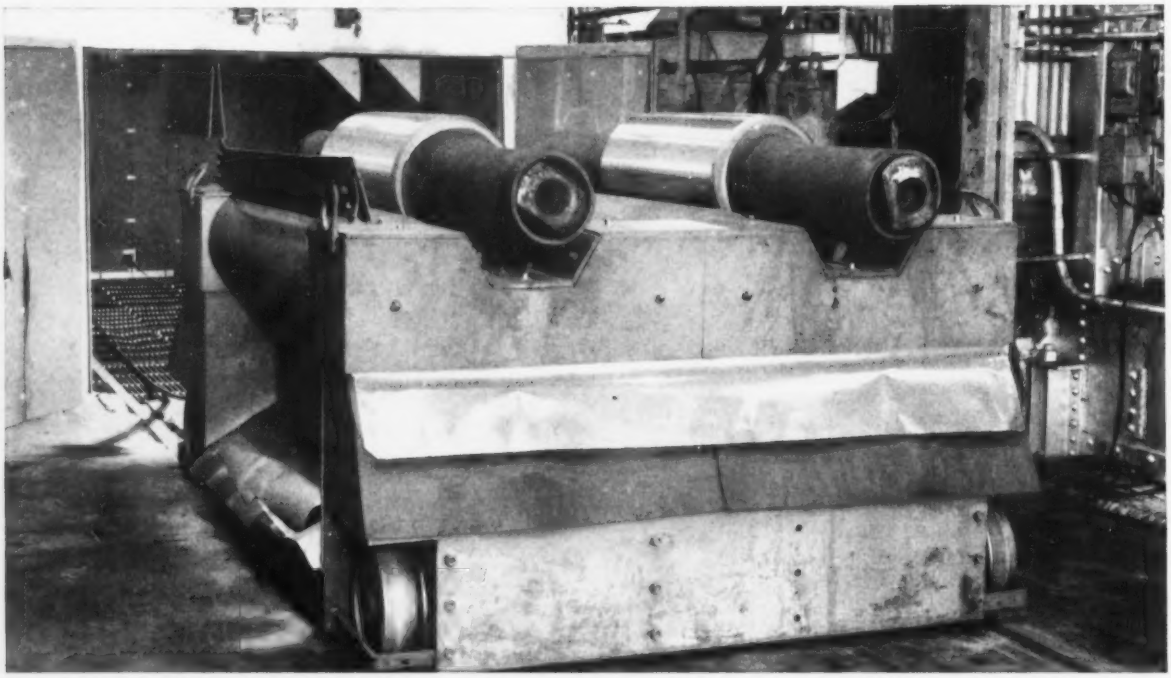
World's Largest Producer of
THE LIQUID CARBONIC CORPORATION
Chicago 23, Illinois

MAIL THIS COUPON:

THE LIQUID CARBONIC CORPORATION
3164 South Kedzie Avenue • Chicago 23, Illinois
Please send me Liquid Carbonic's complete technical data on new CO_2 shielded gas welding.

Name_____
Company_____
Address_____
City_____ Zone_____ State_____

Which advantage is most important to you?



You get them all in WHEELABRATOR® mechanical mill roll etching

? Uniform etch

? Longer roll life

? Better product finish

? Time savings

? Cost reductions

The mechanical and automatic nature of Wheelabrator mill roll etching brings you all of these advantages. For instance, it eliminates the opportunity for human error. Once calibrated, it automatically produces a uniform etch, with optimum penetration, roll after roll. This also means longer roll life — as much as 30% more service life. There are no areas of shallow etch to cause too-frequent dressing and no areas of too-deep etch to cause waste of roll surface in successive etchings. This uniformity also provides more uniform surface finishes on the final product.

Variety in type and size of abrasive, velocity and volume of abrasive, speed of work travel and rotation and other variables are easily adjusted to provide close control of the surface etch. This means a single machine can produce a wide variety of finishes, each meeting a precise surface roughness specification. Time and cost savings come from speed of etching, recently improved by a work car that carries two rolls at once. This not only saves etching time but also reduces mill delay. In addition, changeover for different finishes is faster and re-roll tonnage is reduced because a flatter strip is produced under increased screwdown pressures.

Why not get all of these advantages in your plant for swift, sure mill roll etching?

WHEELABRATOR®
CORPORATION

510 South Byrkit Srreet Mishawaka, Indiana

WRITE FOR details on the many new improvements in the Wheelabrator method of etching.

TUBING IDEAS LIKE THESE

simplify design, increase production, reduce cost!

Ideas for new or improved products are easy and economical to carry out when they call for Van Huffel tubing.

Shown are a few of the ideas Van Huffel has roller die, cold formed to any length from a wide variety of metals: hot or cold rolled steel, stainless steel, high strength steels, aluminum, copper, brass, etc., in gauges from .003 to .312; from forming dies designed and built in our own plant.

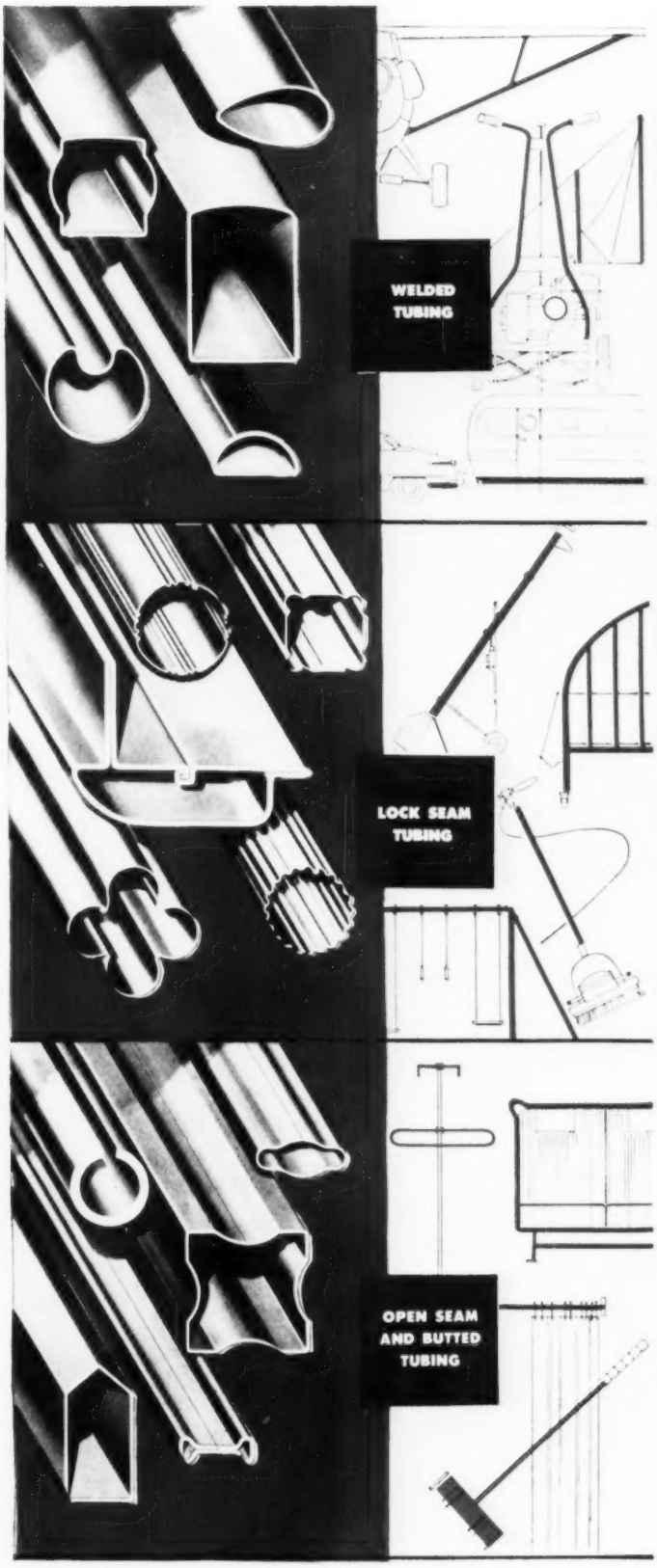
In addition, Van Huffel fabricating services: notching, bending, punching, tapering, flanging, beading, etc., can help you make your ideas take shape . . . profitably.

FOR YOUR FILES

24-page Size Brochure on Van Huffel lock seam, butted, welded tubing; angles and channels.

32-page Welded Tubing Handbook containing engineering data in handy reference form.

van huffel
TUBE CORPORATION • WARREN, OHIO



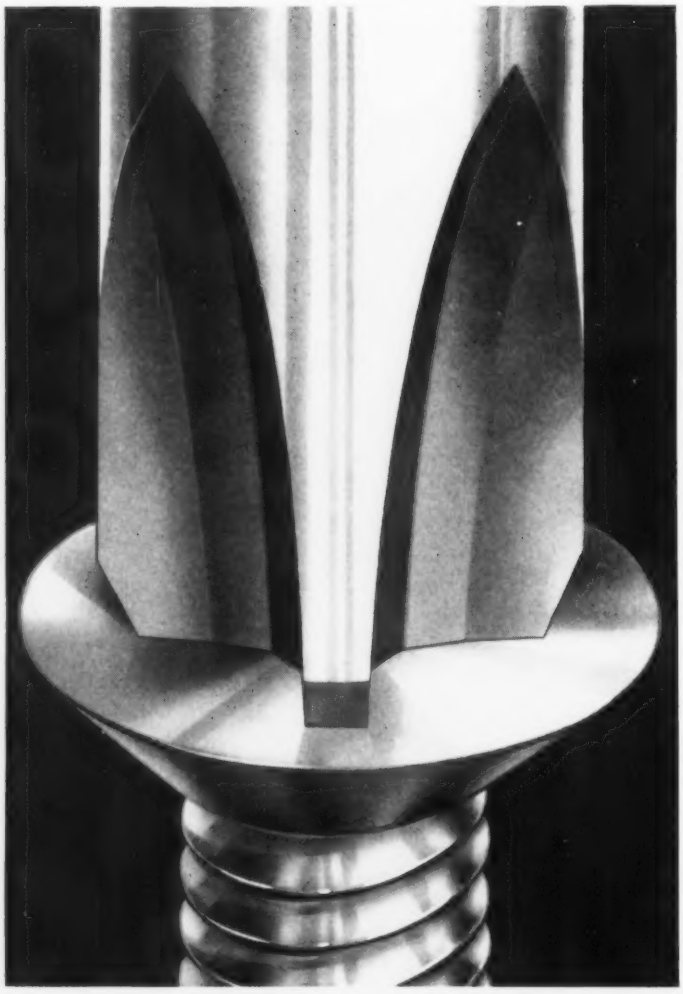
where ideas take shape

Natco Naturals

Any time your parts require machining *more than one hole*–drill, bore, face or tap–it may well be a "Natco Natural." Your standard Natco will produce

To get "We-care-about-you" Service,

AMERICAN is the name!



Whoever you are, *wherever* you are, American is set to service your fastener needs with a schedule to meet your requirements.

It is this interest in *your* needs that gives American an extra plus in the four main factors that govern your true fastener costs.

American gives you more of all four

More in quality . . . with 30-minute exactness checks plus dimensional and physical inspections.

More in research . . . with important, new cost savings for you in your assembly and tooling, by the company that developed the original Phillips fastener.

More in service . . . with inventories maintained in key locations and facilities to meet your most demanding production schedule.

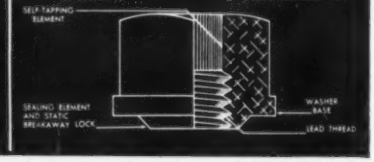
You may find *local* price differences occasionally, but nowhere will you get more of all four than at American.

Make your own comparison — send your inquiry for price and delivery of stock fasteners . . . or send your specifications for special units. Be sure to ask for American's Stock List.

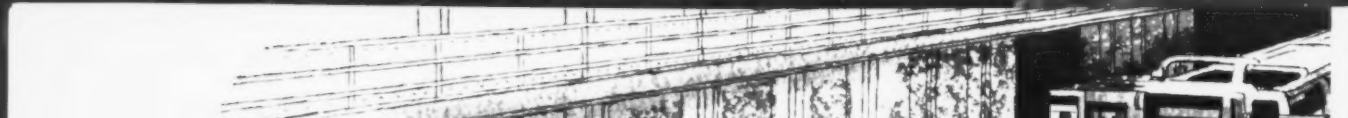
AMERICAN SCREW COMPANY
WILLIMANTIC, CONN.
CHICAGO, ILL. • DETROIT, MICH.

American!

New Brilok nylon stop nut offers special advantages in many types of fastening. Lightweight, non-corrosive, non-conductive, self-tapping, locking, reusable. Holds tight, removes easily. Write for samples and prices.



Wood Screws • Machine Screws • Nuts • Tapping Screws • Thread-Cutting Screws and Sems • Specials

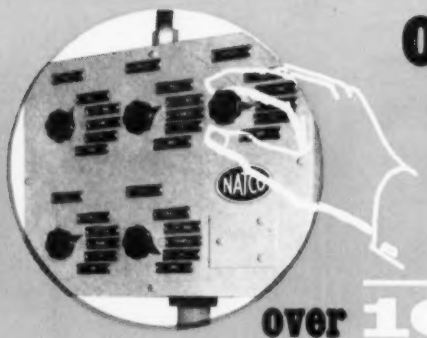


Natco Naturals

Cost-Cutting Ways
You Can Use
Standard Multi-Spindle Natcos

Any time your parts require machining *more than one hole*—drill, bore, face or tap—it may well be a "Natco Natural." Your standard Natco will produce substantial savings in a surprising number of situations, *even in small job-shop lots!* Call in your nearby Natco field engineer; he'll tell you in short order whether you've got a "Natco Natural" there.

NOW...Set up quickly with a twist of the wrist



5 cycles
5 positions
over 100 combinations

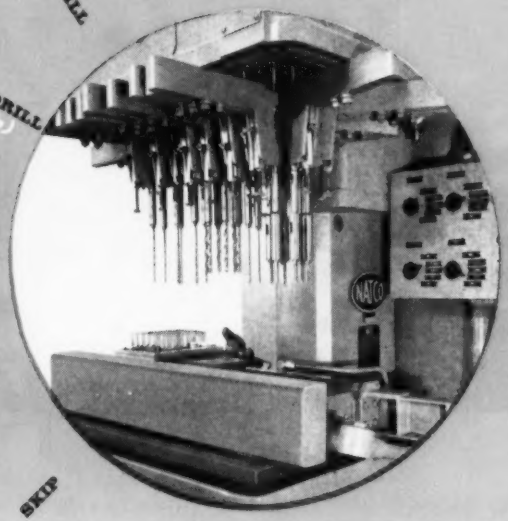
DRILL

STEP DRILL (deep hole)

CHAMFER (short feed)

TAP

SKIP



STRAIGHT-LINE INDEX TABLE COMBINED WITH PRE-SET CYCLE SELECTOR

The five-position table mounted on a Natco H-6 adjustable spindle machine equipped with selector control panel makes it possible for the operator to pre-set over 100 machining combinations. Thus the capacity of the machine is greatly increased in number of holes, in complexity of hole patterns, and in variety of machining operations. Machine investment is kept at a minimum for the volume of work produced.

Select either of

- **2** DEPTHS OF FEED *automatically*
- **2** FEED RATES *automatically*
- **2** MOTOR SPEEDS *automatically*
- **2** INDIVIDUAL SPINDLE SPEEDS PLUS NEUTRAL

Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 50 hp machines with up to 72 spindles. Spindles in standard Natcos are driven through universal joints and located by either adjustable arms of bored slip plates.

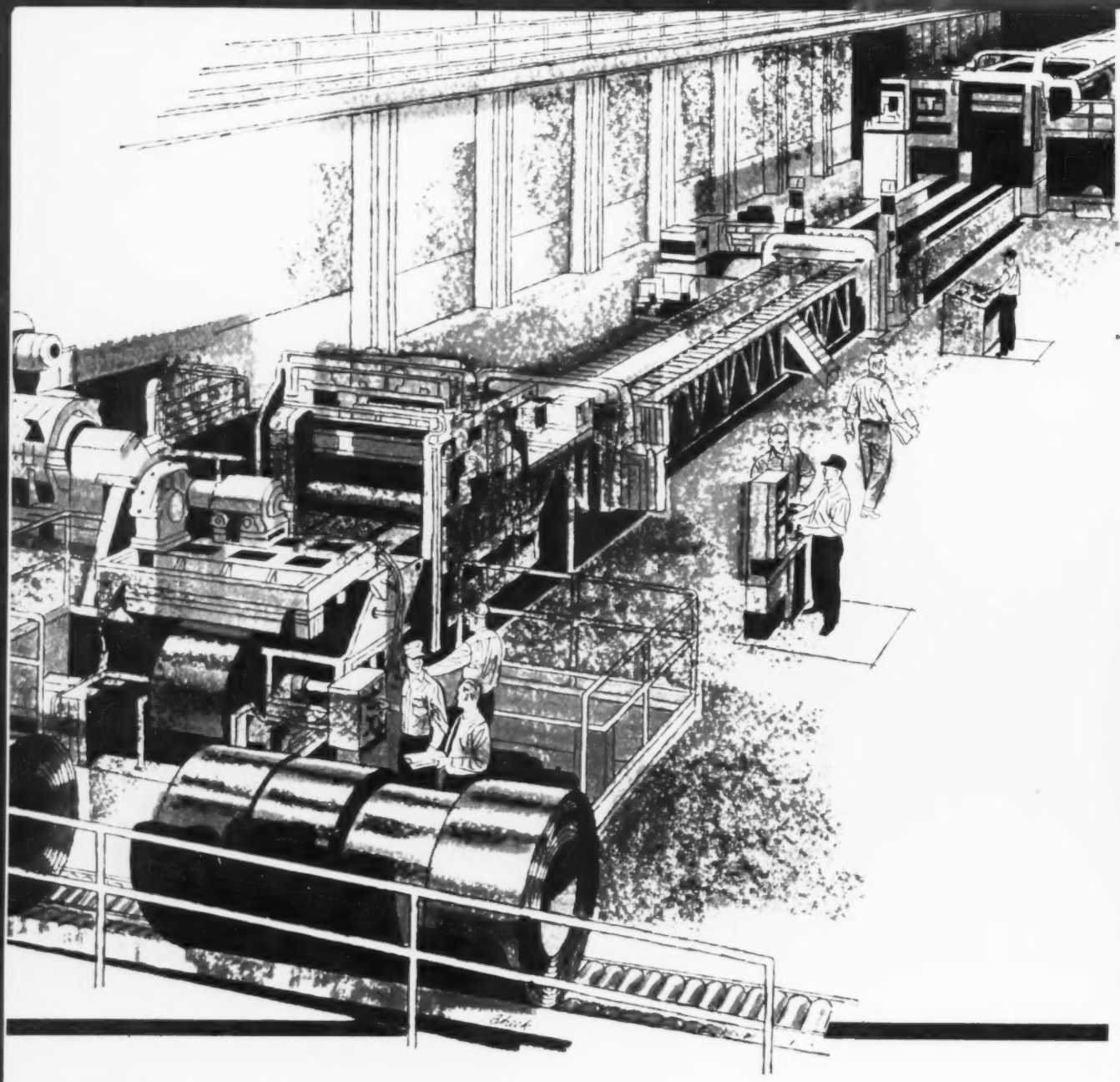
NATCO

National Automatic Tool Company, Inc.

Richmond, Indiana

Multi-spindle drilling, boring, facing & tapping machines. Special machines for automatic production.

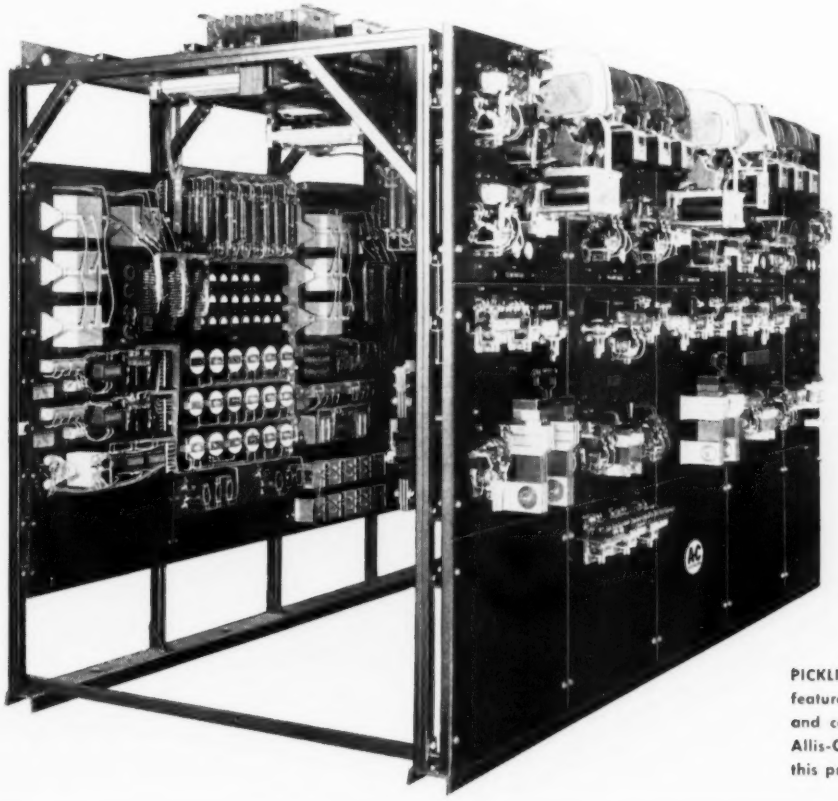
Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.

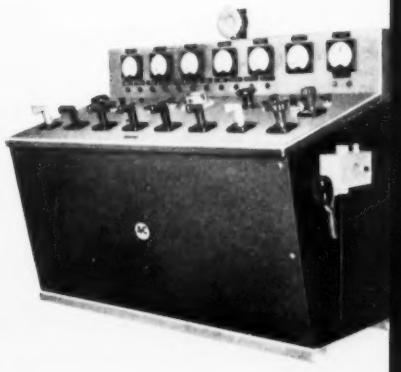


ALLIS-CHALMERS CONTROL...

from furnace to finish

Get ultimate precision control for your pickling line





PICKLING LINE CONTROL, especially designed to the job, features magnetic amplifier regulators for quick response, and complete coordination from entry to delivery section. Allis-Chalmers motors and generators are coordinated with this precision control.

The continuous flow of steelmaking requires step-by-step coordination through the main mill to final process lines. All along the line, Allis-Chalmers control is tailored for each specific operation — yet designed with *your* entire system in mind.

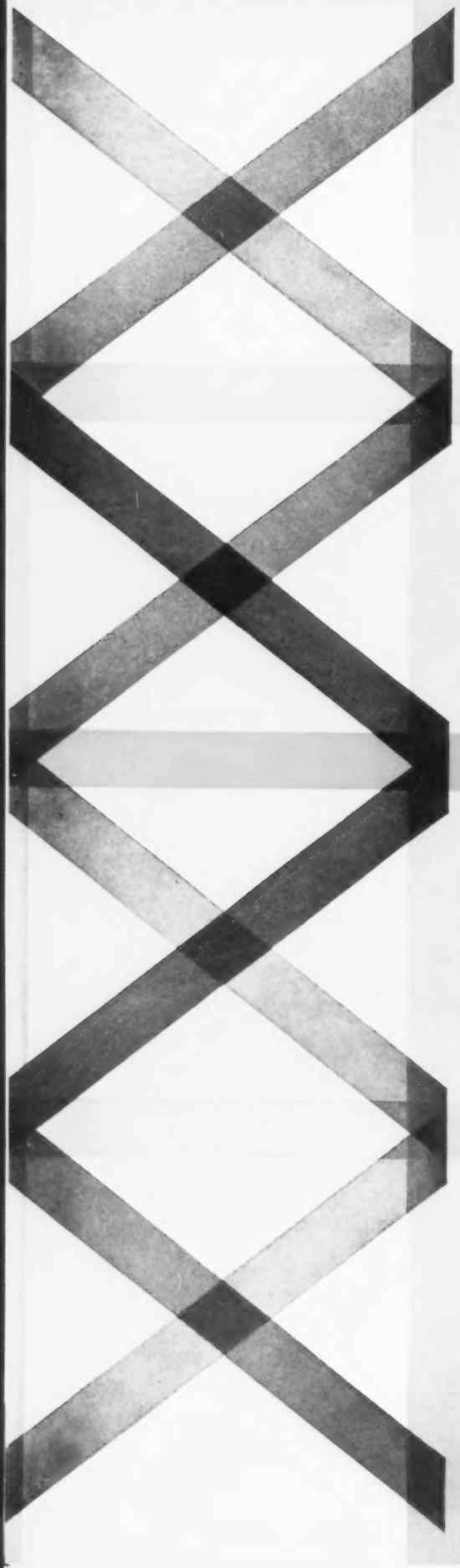
Backed by A-C engineering skill and comprised of quality components, this custom control gives accurate speed and tension regulation from bloom to sheet. It means ultimate control for maximum steel output.

That's why Allis-Chalmers control is gaining more and more acceptance in the mills. Contact your A-C representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A 5450



The pit nobody liked...

except our customers

This is of course our one-way fired soaking pit . . . fired from the top.

The location of the burner is only one of the features responsible for its enthusiastic acceptance. Most important however are the 30 years of experience and refinements which we have built into the pit since we first introduced it.

That is why, today, it is the pit everybody respects . . . especially our customers.

STEEL MILL, HEAT TREAT, GLASS DIVISIONS

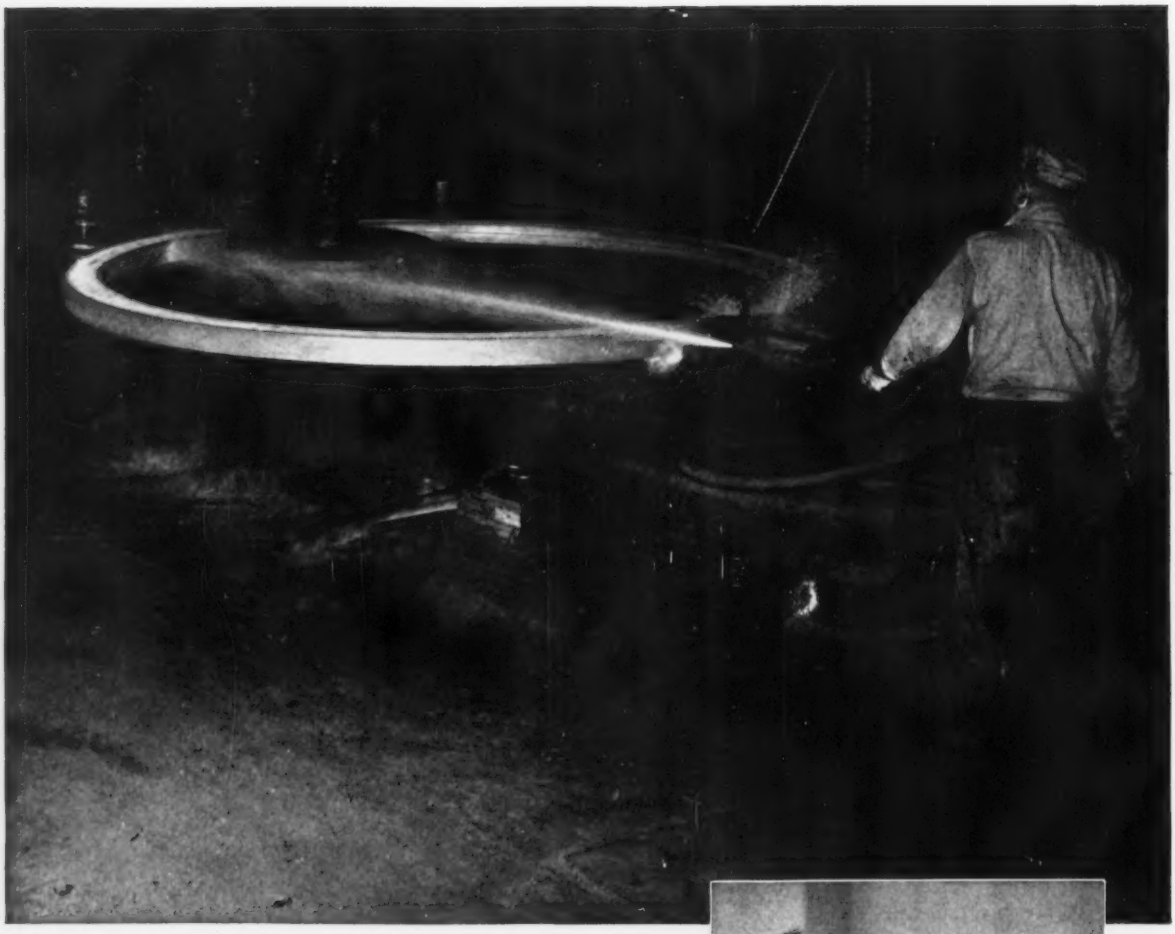
SURFACE COMBUSTION CORPORATION

2402 DORR ST., TOLEDO 1, OHIO

wherever heat is used in industry

Associated Companies: British Furnaces, Ltd., Chesterfield • Stein & Atkinson, Ltd., London • Stein & Roubaix, Paris • S. A. Belge, Stein & Roubaix, Bressoux, Liege • S. A. Forni Stein, Genoa • Chugai Ro Kogyo Kaisha, Ltd., Osaka • Benno Schilde Maschinenbau, A. G., Bad Hersfeld

Surface®



"Your company will go all-out to give the best possible service"

These are the words of Fred O. Reedy, president of Kennedy-Van Saun Mfg. & Engineering Corporation, Danville, Pa. He was writing about two seamless steel rings his company required to complete a huge rotary cooler.

The larger of the two rings called for an outside diameter of 109½ in.; the other for one only slightly smaller. We forged them of special-analysis steel made in our own plant, rolled them to shape, quenched and tempered them for the right hardness and other physical characteristics—then finish-machined them to close tolerances—*and got them to our customer on time.*

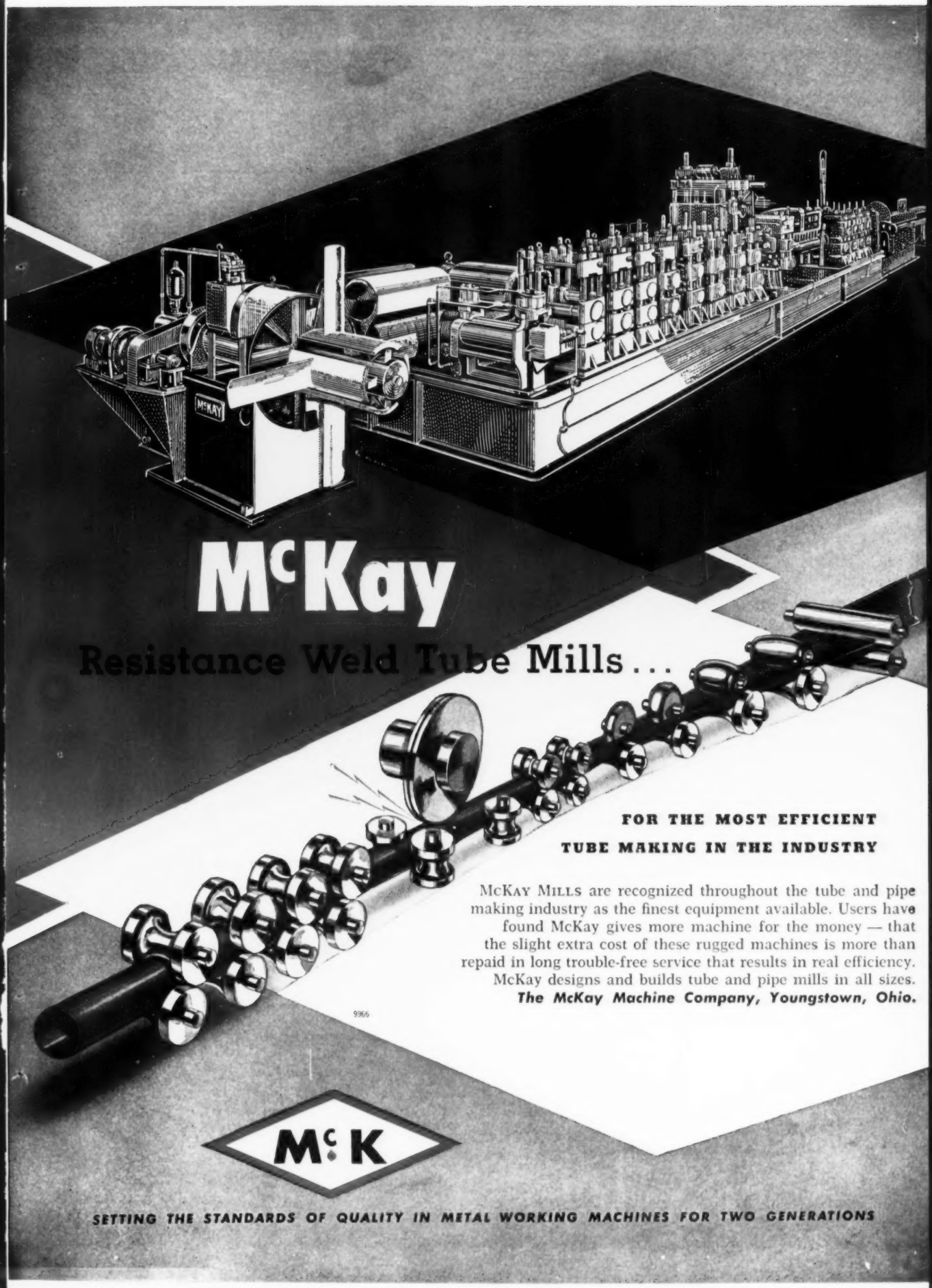
The compliments from Mr. Reedy are among hundreds along the same lines in our files. We can be proud of the products we manufacture and the good service we provide—service we believe not many mills can match.

Write Dept. 1L today for the story on special-order rings, flanges and open-die forgings by Standard Steel.

"When our Purchasing Department explained the importance of this emergency job and stated how badly we needed these forged steel rings, you agreed to supply them in 2 weeks' time and your shipment was right on schedule."

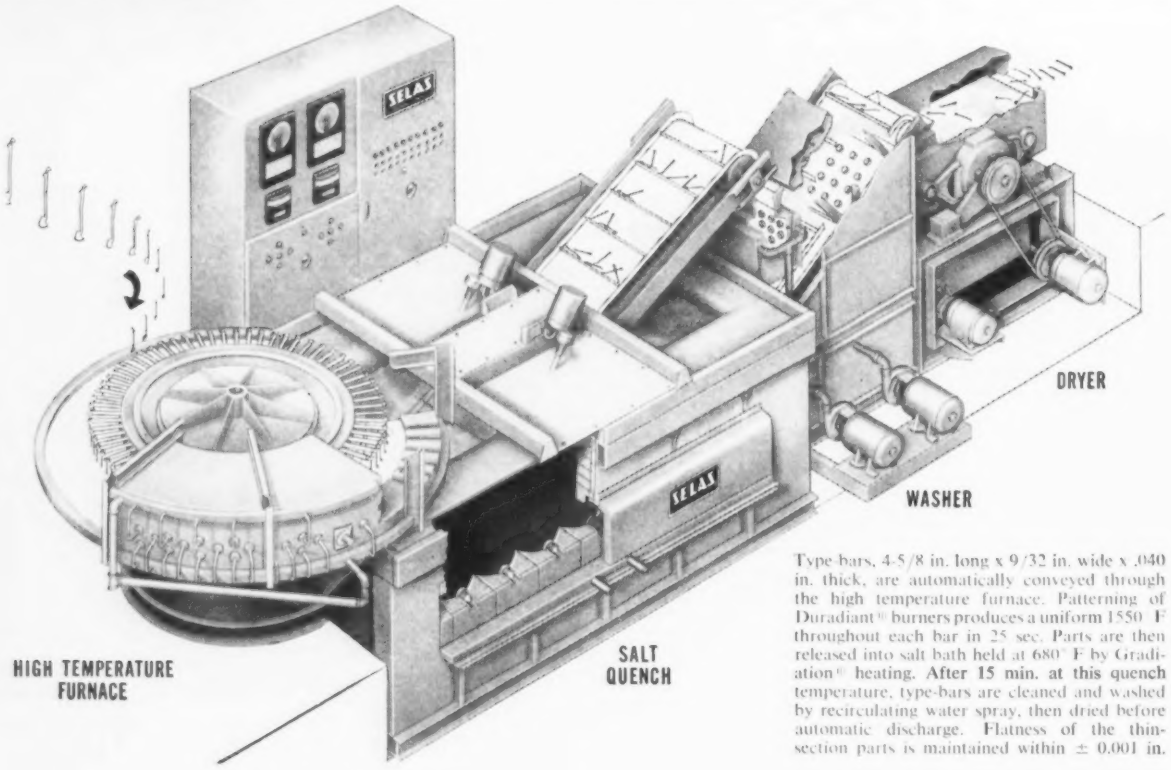
Standard Steel Works Division
BALDWIN · LIMA · HAMILTON

BURNHAM, PENNSYLVANIA Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes


McKay
Resistance Weld Tube Mills . . .
FOR THE MOST EFFICIENT
TUBE MAKING IN THE INDUSTRY
McKay Mills are recognized throughout the tube and pipe making industry as the finest equipment available. Users have found McKay gives more machine for the money — that the slight extra cost of these rugged machines is more than repaid in long trouble-free service that results in real efficiency. McKay designs and builds tube and pipe mills in all sizes.
The McKay Machine Company, Youngstown, Ohio.
9966
McK
SETTING THE STANDARDS OF QUALITY IN METAL WORKING MACHINES FOR TWO GENERATIONS

Here's NEW mobile efficiency

IBM Reports Labor Savings of 40%



Type-bars, 4-5/8 in. long x 9/32 in. wide x .040 in. thick, are automatically conveyed through the high temperature furnace. Patterning of Duradiant® burners produces a uniform 1550° F throughout each bar in 25 sec. Parts are then released into salt bath held at 680° F by Gradiation® heating. After 15 min. at this quench temperature, type-bars are cleaned and washed by recirculating water spray, then dried before automatic discharge. Flatness of the thin-section parts is maintained within ± 0.001 in.

. . . SELAS automatic heat-treating unit austempers more than 3,000 type-bars per hour

Three men do the work previously performed by five with this integrated Selas heat-processing equipment. When automatic loading, for which the unit was designed, is added, the full production capacity of 5,000 type-bars per hour will be attained and further labor savings effected.

IBM electric typewriters require hard, tough, extremely flat type-bars for dependable performance. These characteristics are produced by heating the steel above the critical temperature, quenching at elevated temperature to permit isothermal transformation to occur. This process—austempering—is not new . . . the coordinated, multi-stage Gradiation heat-treating unit *is* new, offering a fresh approach to complex heat processing.

Cut-away view delineates continuous process cooperatively developed by IBM and Selas engineers. Actual unit, compactly fitted into minimum floor area, was completely built at Selas . . . including panel-mounted combustion and temperature controls.

For nearly a year the unit has been austempering steel type-bars at high production rates, at IBM's Kingston, New York, plant, with virtual elimination of rejects. So satisfactory has been the performance that a similar unit, for heat-treating other IBM electric typewriter parts, has been ordered and is now under construction at Selas.

To learn how Selas can help solve your particular heat processing problem also, write Department 112.

SELAS
CORPORATION OF AMERICA
DRESHER, PENNSYLVANIA

Heat and Fluid Processing Engineers
DEVELOPMENT • DESIGN • CONSTRUCTION

Here's NEW mobile efficiency for YOU!

BUCYRUS-ERIE

11-B

TRANSIT MACHINE

CRANE
CLAMSHELL
DRAGLINE
HOE
SHOVEL

$\frac{3}{8}$-yd. excavator
10-ton lifting crane

In crowded yards or from plant to plant . . .

The NEW Bucyrus-Erie 11-B Transit Machine is ready to roll extra savings into your industrial materials handling program.

You'll profit from the 11-B's simple, compact design; from its versatility and economical operation. You'll find the 11-B provides new speed and mobility for efficient performance on lifting, digging, loading, erecting, and plant maintenance jobs. What's more the 11-B gives you time-saving accessibility for low cost maintenance.

The two-section cab provides ample room for the operator and features sliding, hinged, and removable panels that open to power plant and main machinery. Unit or bench assemblies in main machinery permit quick service and easy replacement, minimizing downtime.

Fill in the coupon below and drop it in the mail TODAY. Give us an opportunity to explain ALL the advantages of the 11-B's simple, easy-does-it-design. You can enjoy *unmatched quality at low cost* with this fast-moving, hard-working, easy-to-maintain mobile crane-excavator.

368E57C

BUCYRUS ERIE

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BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

SEND FOR COMPLETE FACTS NOW!

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen: Please send me details on the new 11-

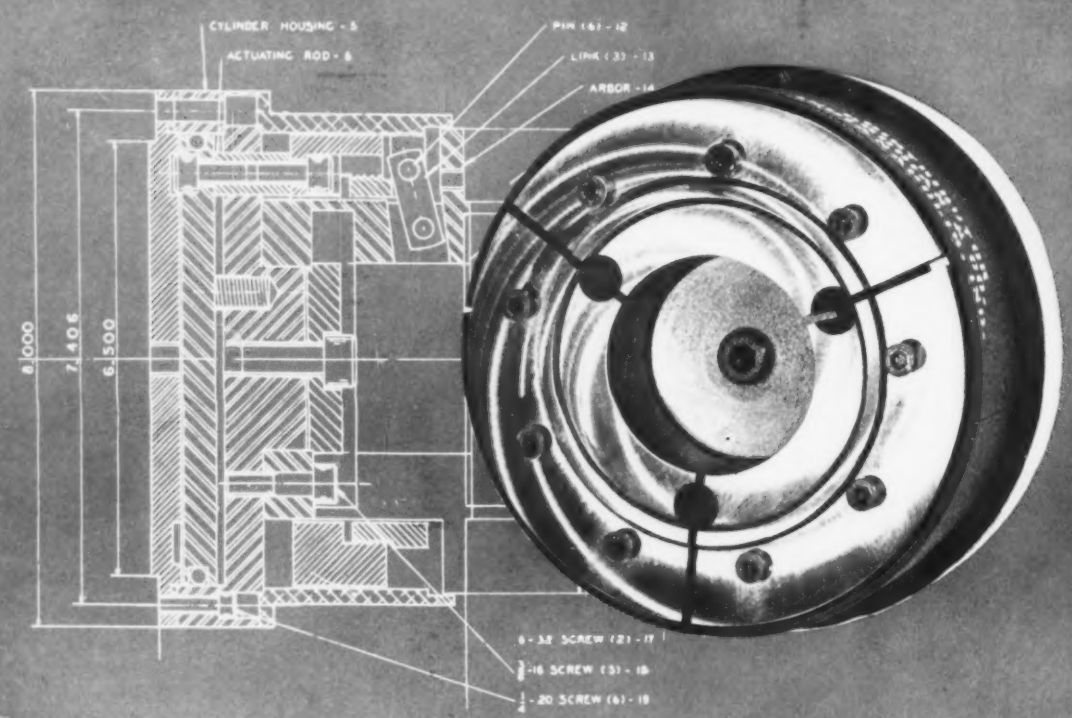
Name

Organization

Address

City State

Arbors, links, jaws, and often the air cylinders of these Stace-Allen precision air chucks are made of Crucible MAX-EL. Manufacturer: Stace-Allen Chuck Company, Indianapolis, Ind.



nondeforming, easy-machining MAX-EL alloy steel chosen for precision chuck parts

Several components of Stace-Allen precision air chucks, which are made of Crucible MAX-EL® alloy steel, are finish machined *after full heat treatment*. This can be done because MAX-EL machines easily, even at hardnesses as high as 352 Brinell—or higher, with special tooling.

Other components, on the other hand, are machined, then heat treated. MAX-EL is used here because Stace-Allen finds there is minimum distortion in these parts after hardening.

But try MAX-EL for yourself. Whether your production schedule calls for machining-then-hardening—or the other way around—you'll find easy-machining, nondeforming MAX-EL a natural selection. Call your local Crucible warehouse for quick delivery of MAX-EL in the grade or size you need. And for more MAX-EL facts, write us for a free Data Sheet. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

PRODUCTION MACHINERY

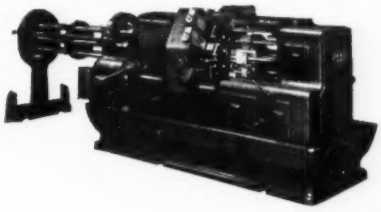
GREENLEE

AUTOMATIC BAR MACHINES

HELP YOU BEAT RISING PRODUCTION COSTS

The cowman achieves speed and power in a good "using" horse by years of careful breeding . . . Greenlee develops these same qualities in its Bar Automatics by continuous research and design improvement. One of the many superiorities of this speed and power is that it enables you to take full advantage of modern tooling practices. Your Greenlee representative will be glad to show you how it is done. Please submit print when inquiring about a specific job.

Write for Catalog No. A-405



SIX AND FOUR-SPINDLE AUTOMATIC BAR MACHINES

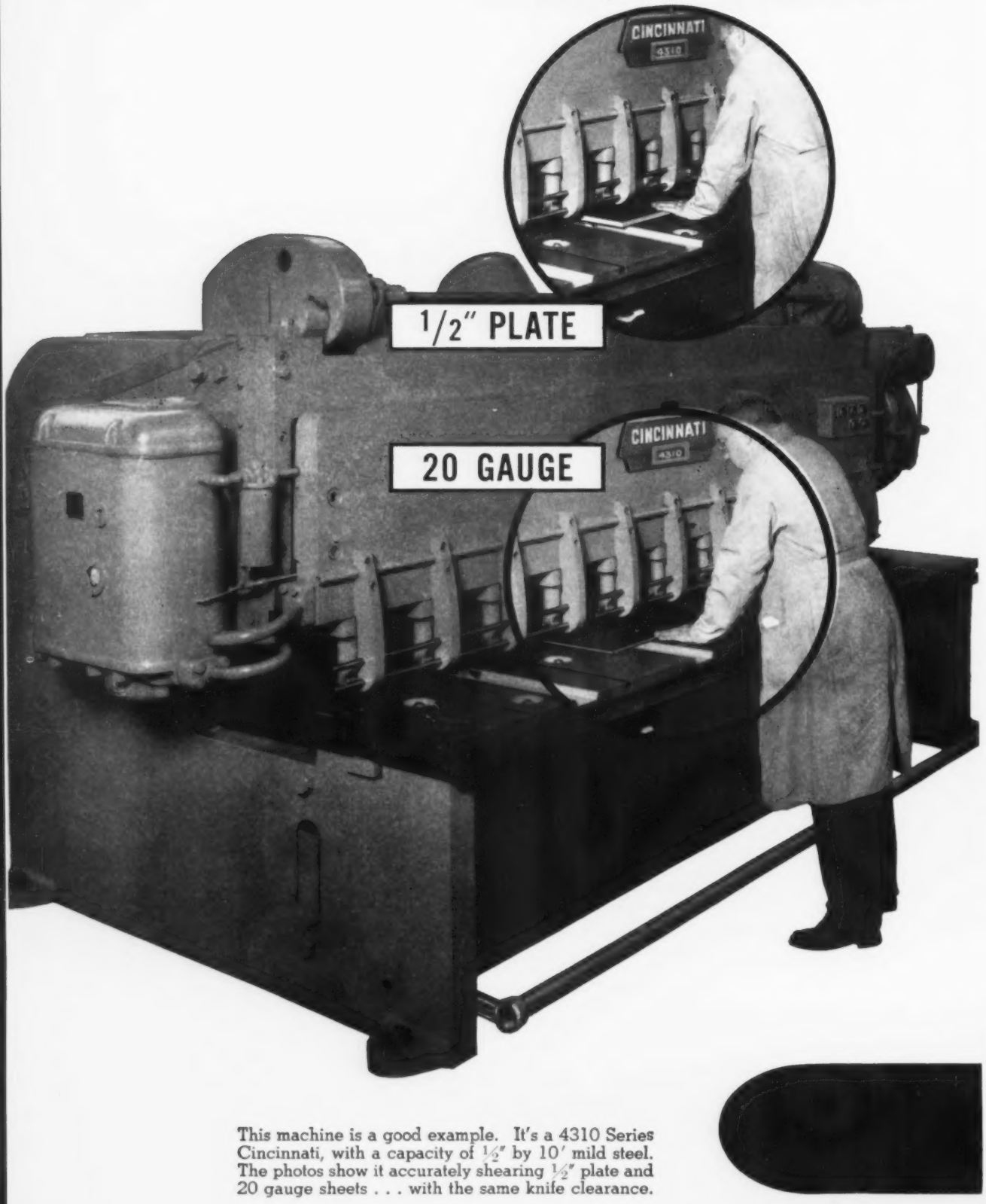
GREENLEE Special Machine Tools

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Hydro-Borer Precision Boring Machines

GREENLEE
BROS. & CO.

1811 MASON AVE.
ROCKFORD, ILL.

CINCINNATI



This machine is a good example. It's a 4310 Series Cincinnati, with a capacity of ½" by 10' mild steel. The photos show it accurately shearing ½" plate and 20 gauge sheets . . . with the same knife clearance.

accurately shears thin sheet and heavy plate...

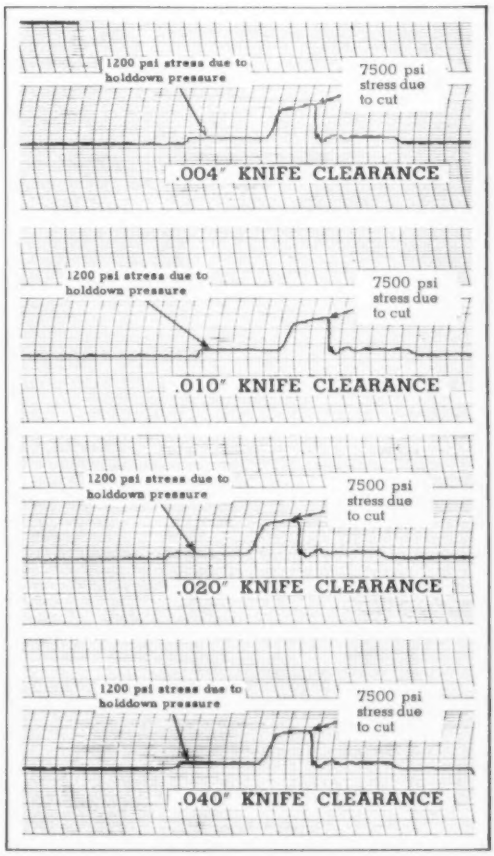
without changing knife clearance!

You don't have to change knife clearance each time you cut a different thickness on a Cincinnati Shear. With the knife clearance set for thin material, Cincinnati Shears will accurately cut all thicknesses up to capacity.

This statement is being demonstrated daily, by the thousands of Cincinnati Shears in operation. Carefully conducted engineering tests have proven the following facts:

- Knives last just as long when cutting different thicknesses with one knife clearance, as when clearance is changed for each thickness.
- A Cincinnati Shear works no harder when cutting with a close clearance than it does with a large clearance.
- Shearing with one knife clearance is safe, since thin sheets cannot become accidentally wedged between the knives.
- Cincinnati Shears with single knife clearance are time-savers, since the unnecessary clearance-changing operation is eliminated.

The results of two of these tests are shown at the right. For complete information on Cincinnati All-Steel Shears, write Department B for Catalog S-7R.


1200 psi stress due to holddown pressure
7500 psi stress due to cut
.004" KNIFE CLEARANCE
1200 psi stress due to holddown pressure
7500 psi stress due to cut
.010" KNIFE CLEARANCE
1200 psi stress due to holddown pressure
7500 psi stress due to cut
.020" KNIFE CLEARANCE
1200 psi stress due to holddown pressure
7500 psi stress due to cut
.040" KNIFE CLEARANCE

These tests show stress in a Shear frame when cutting heavy material, using different knife clearances. They prove that cutting pressure is not affected by knife clearance.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS · SHEARS · PRESS BRAKES

CINCINNATI

STAINLESS STEEL

CORROSION-RESISTANT HEART FOR FOSTORIA* MAGNETIC PUMPS

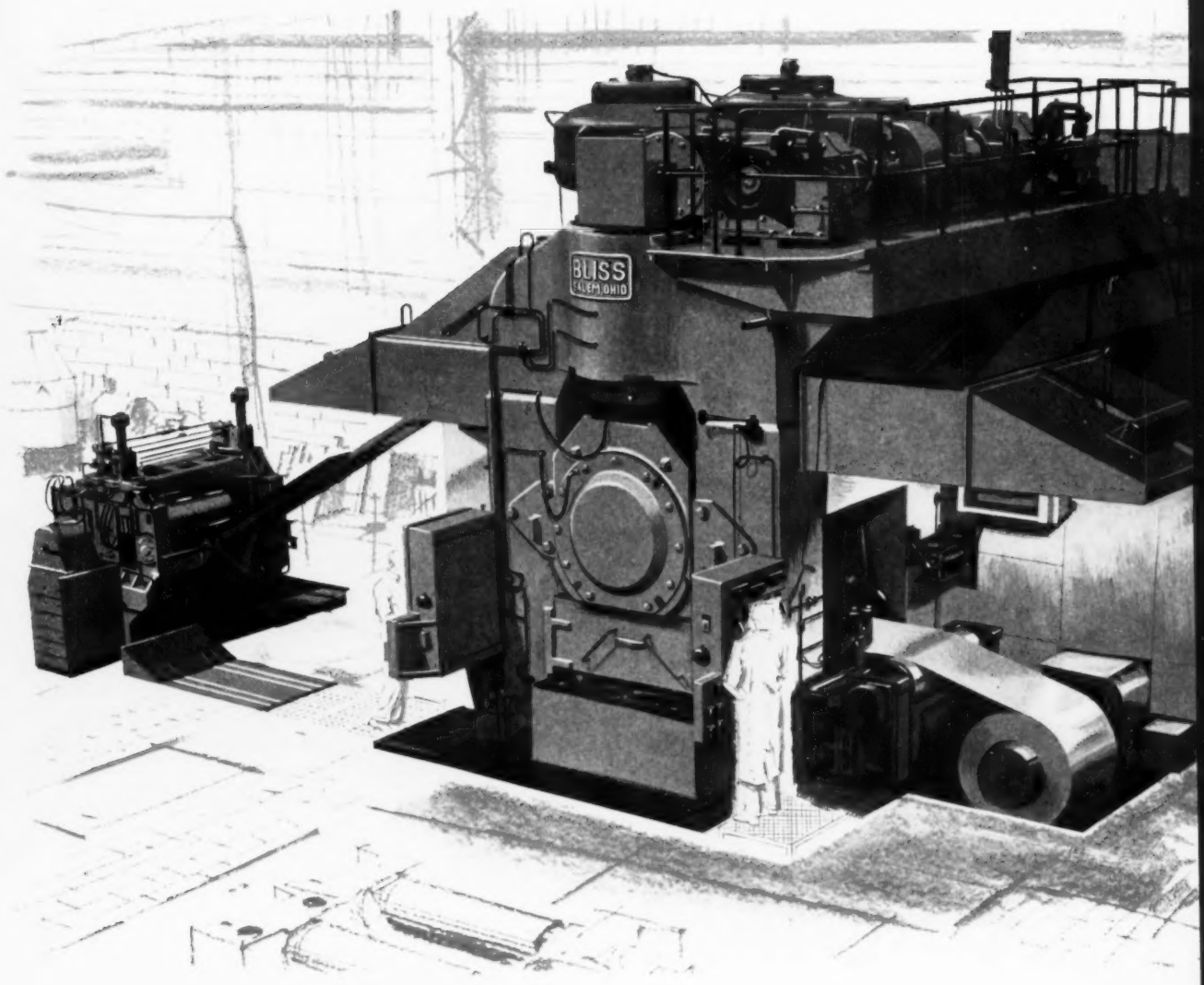
Design of Fostoria's Dynapump called for a corrosion and wear resistant hollow shaft, with drilled slots in one end. As an integral part of the pump, dimensional accuracy was critical and the O.D. had to be ground to provide a smooth bearing surface. Damascus ⅞" x 16 gauge stainless welded tubing was selected — a wise choice for handling both corrosive and non-corrosive fluids.

**The Fostoria Pressed Steel Corporation, Fostoria, Ohio, manufacturers of pumps for industrial and residential use.*

DAMASCUS TUBE COMPANY
STAINLESS STEEL TUBING AND PIPE
GREENVILLE, PENNSYLVANIA

FORMED STEEL TUBE INSTITUTE

WRITE FOR FREE CATALOG



Belgian plant comes back to Bliss for another mill

The Phenix Works, Societe Anonyme, of Flemalle-Haute, Belgium, has just installed its second Bliss mill, a big four-high reversing type that will greatly increase the plant's output of cold rolled sheet products.

The mill has 16" and 53" by 48" rolls, a maximum speed of 2000 feet per minute and coil handling equipment for 30,000-pound, 64"-O.D. coils. It is being used to roll both sheet products and tinplate.

Phenix Works put in its first Bliss mill seven years ago. The second installation is the logical outcome of the company's experience with Bliss equipment and engineering... additional evidence that "The Free World rolls on Bliss mills."

Yours for the asking...

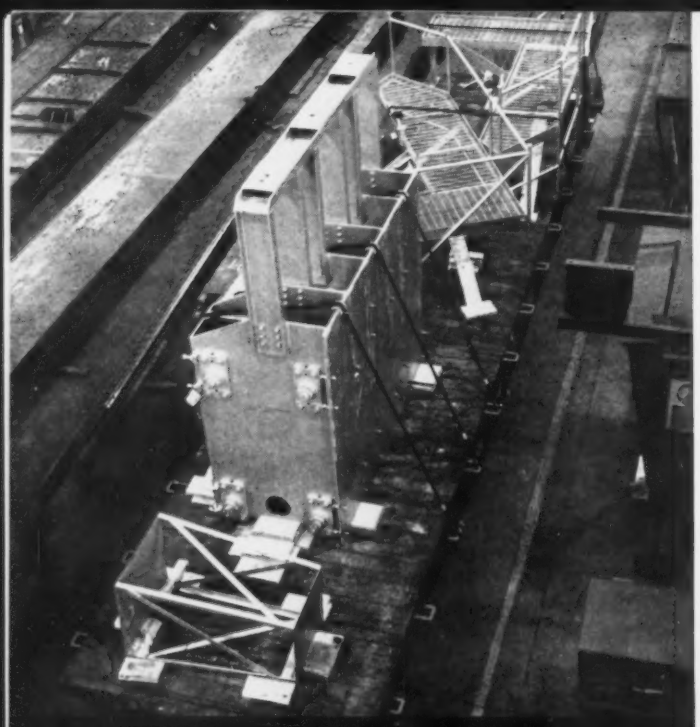
For more information on typical Bliss rolling mill installations, write us today for a free copy of our 60-page Rolling Mill Brochure, Catalog 40-A.

BLISS
SINCE 1837

100 years of making metal work for mankind

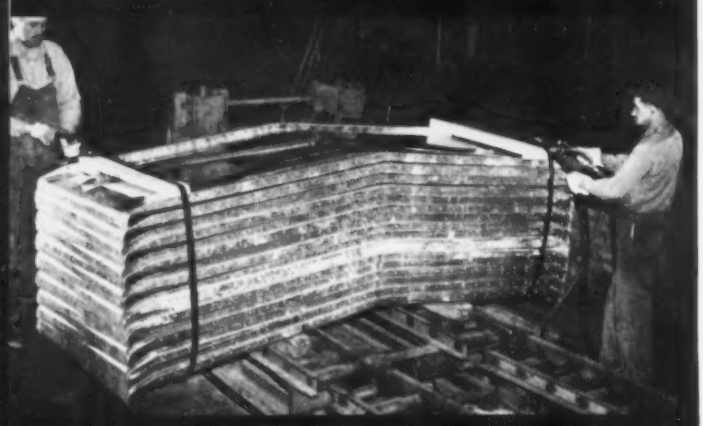
E. W. BLISS COMPANY, Rolling Mill Division, Salem, Ohio

Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio



ACME STEEL **STEEL STRAPPING** secures and protects electric furnace for shipment by flat car. *(Idea No. U2-3)*

ACME STEEL **STEEL STRAPPING** unitizes aluminum ingots for better handling and storage. *(Idea No. U6-16)*



ACME STEEL **STEEL STRAPPING** unitizes steel stampings for easier handling and shipping. *(Idea No. U6-20)*

AIM* for better handling, protection, storage

You can gain important materials handling, protection and storage advantages by applying Acme Steel unitizing and carload bracing Ideas to your operations. Safe, secure packages and shipments result in increased handling speed and labor-materials economies, bringing you important savings and greater customer satisfaction. It's easy to find out how.

Located near your plant is an Acme Idea Man thoroughly experienced in product protection for the primary and fabricated metals industries. He is immediately available to discuss your specific problems and provide hundreds of performance-proved Acme Steel Strapping Ideas, without cost or obligation. The seven Ideas on these pages are included among the Ideas-In-Action Reports your Acme Idea Man will be glad to show you. Among these many Reports—all of which have been developed from actual experiences of dozens of industries—are certain to be Ideas that can be applied to your problems, for better, faster, more economical product handling, protection and storage.

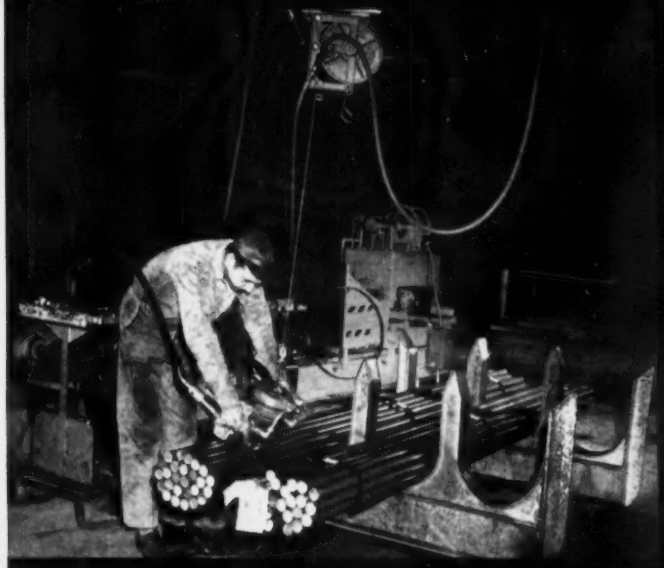
Your *Acme Idea Man can be contacted at the nearest Acme Steel Company office. Simply look under "Steel Strapping" in your classified telephone directory, or send the coupon for full facts and information.

ACME STEEL **STEEL STRAPPING**

ACME STEEL **STEEL STRAPPING** braces loads of wire fencing for safe, secure shipment in gondola cars. *(Idea No. U3-1)*

ACME STEEL **STEEL STRAPPING** machine bundles boxes of kitchen utensils for easier handling. *(Idea No. S2-14)*

ACME STEEL **STEEL STRAPPING** palletizes heavy wheel and brake assemblies for fast, mechanical handling. *(Idea No. U6-19)*



ACME STEEL **STEEL STRAPPING** applied with pneumatic tools speeds unitizing of cold-drawn steel bars. *(Idea No. U6-18)*

2 IDEA BOOKS

These two information packed Acme Steel Idea Books are available to you on request. They will provide dozens of clues to better ways to package and protect your products and plant output.

Write today for your choice of the above two Acme Steel Idea Books. Merely indicate the books you want on the coupon at the right and mail. Your request will be filled promptly, with no obligation.

Acme Steel Products Division
ACME STEEL COMPANY, Dept. IFU-117
Chicago 27, Illinois

Please send me the new Acme Steel Idea Books I have checked below:

☐ Steel Strapping Catalog ☐ Unitizing Catalog
☐ Have an Acme Idea Man call.

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Title_____

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Announcing

THE TOTALLY-NEW LINE OF "BUFFALO" NO. 15 DRILLING MACHINES

The completely new design of the No. 15 drill achieves an all-time high in operational ease, with these many important advances:

- Front-Mounted "Start-Stop" Push Button Switch
- Easy-to-Read Speed Range Table
- Depth Gauge Graduated for Easy Setting
- Conveniently-Placed 3-Grip Spindle Feed
- Belt Guard Quickly Tilts Upward to Simplify Speed Changes
- Hinged Motor Bracket Permits Step-to-Step Belt Changing On the Pulleys Without Tools
- Proper Belt Tension Is Automatically Maintained
- No Tools Needed for Head or Table Adjustments

Newly-designed No. 15 bench and floor bases eliminate grease- and dirt-catching troughs and pockets around working area. Extremely sensitive for small hole drilling, these new machines are sufficiently rigid and heavy to operate at full capacity without strain or wear.

For a demonstration of the versatile new No. 15 Drill, contact your nearby "Buffalo" machine tool dealer. Or, for complete details, write us direct for Bulletin 4024.

All "Buffalo" products feature the famous "Q" factor — the built-in Quality which provides trouble-free satisfaction and long life.

"Buffalo" No. 15 Heavy-Duty Bench Drill

No. 15 Heavy-Duty Floor Drill

No. 15 Pedestal Type Drill

The new "Buffalo" No. 15 line includes bench, floor and pedestal models (bench and pedestal types in 1- to 6-spindle models). Attachments are available for tapping, mortising, routing or spot-facing.

No. 15 Multiple Spindle Bench Drill

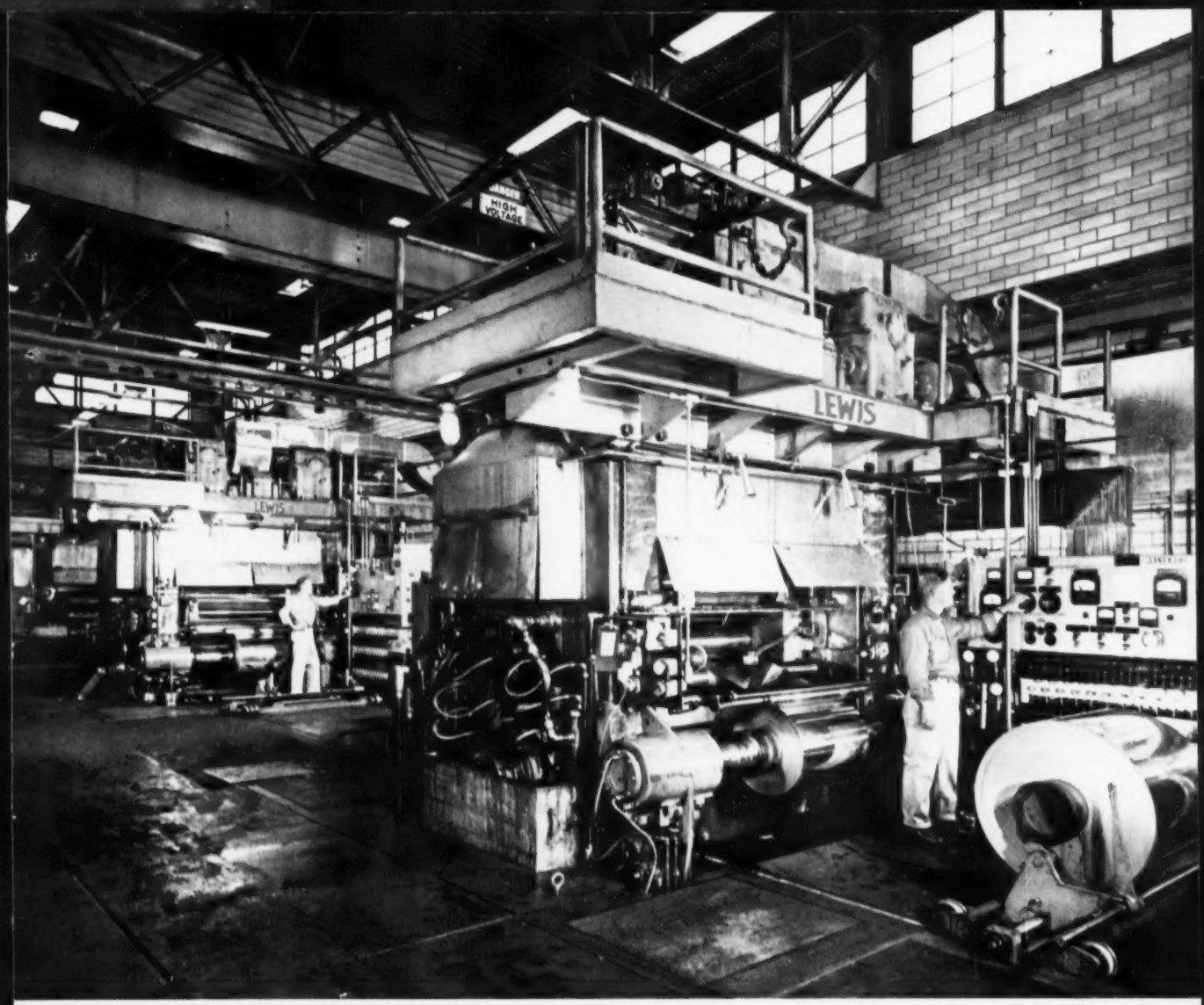
ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

BUFFALO FORGE COMPANY

492 BROADWAY, BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING BENDING



10 and 31 x 62-inch 4 high mill at
Cochran Foil Company, Louisville, Kentucky.

BLAW-KNOX

ALUMINUM FOIL MILLS

Blaw-Knox designs and builds a full range of Aluminum foil mills complete with auxiliary equipment to meet individual requirements. Other Blaw-Knox equipment for metals industry includes complete rolling mill installations including all auxiliary equipment for ferrous and non-ferrous metals, iron, alloy iron and steel rolls, Medart cold finishing equipment, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings.

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Foundry and Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
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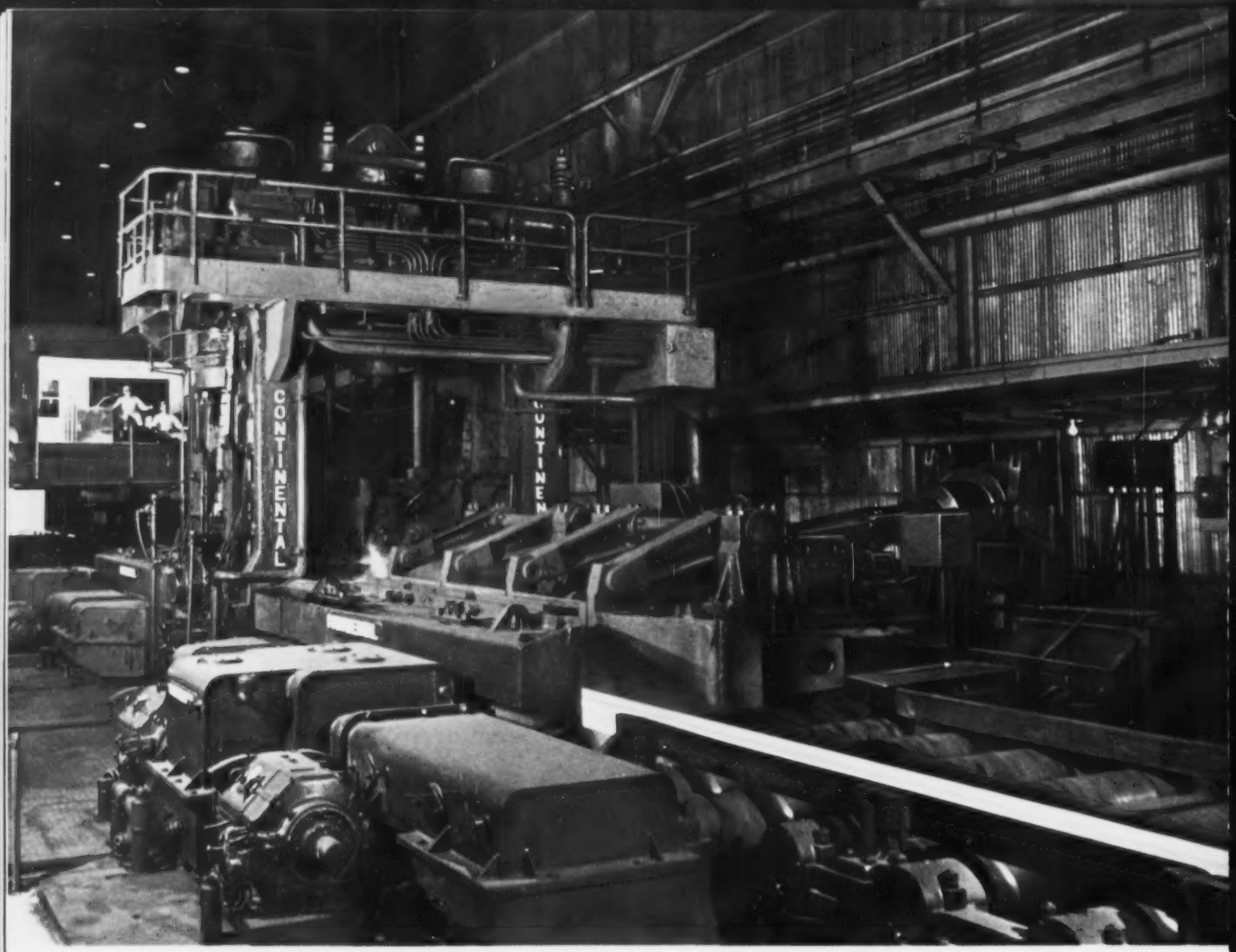

40 x 96 inch, 2-high blooming mill at the Fairless Works of the United States Steel Corporation, designed and built by Blaw-Knox.

BLAW-KNOX

BLOOMING MILLS

Blaw-Knox designs and builds slabbing-blooming mills in a complete range of sizes in high-lift and universal types. Other Blaw-Knox designed equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, iron, alloy iron and steel rolls, Medart cold finishing equipment, carbon and alloy steel castings, fabricated steel plate or composite design weldments, steel plant equipment, and heat and corrosion resisting alloy castings.

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EACH BILLET...

A MILESTONE IN INDUCTION HEATING

● To you, these billets may be worth a few dollars. To us, they are priceless. They symbolize Magnethermic's specialized knowledge in one of the important applications of induction heating—the heating of large metal masses.

Each of these billets represents hundreds of hours of research, developing new concepts for efficient heating of copper, brass, aluminum, steel, titanium, and other metals by induction heating.

Research and over 70,000 KW's of Magnethermic installations give us the experience to design the proper induction heating equipment for hardening, brazing, heat treating, forging, extrusion.

Are you considering an induction heating application? We can give you an unbiased recommendation on the best frequency for your work, including material handling equipment tailored to your production line. Write Magnethermic for prompt, specialized attention.

Induction
Heating
Equipment
60 to 450,000
cycles

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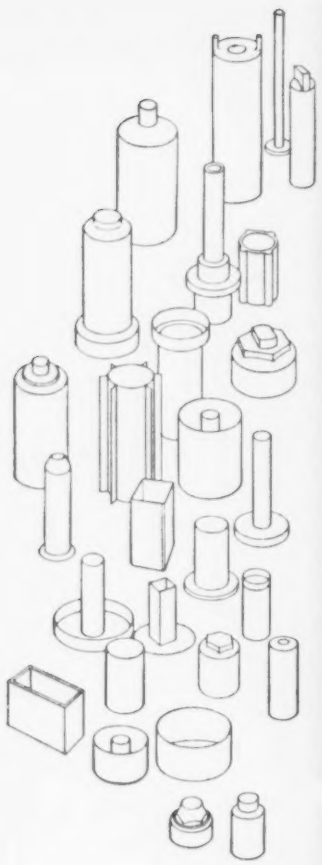
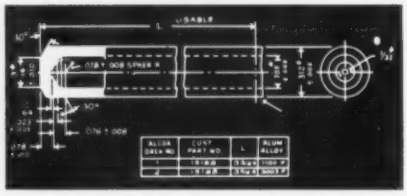




small part, big saving–thanks to an **ALCOA IMPACT**

This interesting little Alcoa® Impact does a big job in a thermostat control designed for use with electrically heated appliances. It is the probe which forms the sensing element of the thermostat. Changes in the length of the probe control the opening and closing of the unit's electrical contacts.

Considering the close tolerances and extreme length-to-diameter ratio of 15 to 1, most designers would visualize this part as a screw machine product. Fabricated on a screw machine, it would call for a drastic deep-drilling operation into solid bar stock, plus a further chamfering and cutoff operation on the closed end. In short, it would be a fairly expensive and troublesome part to produce.

As an Alcoa Impact, however, just one punch of the press delivers a complete, close-tolerance part in a fraction of a second. The only finishing operation required is the cutting of the piece to the exact length required. The production economies are easy to see. And remember, just about any closed-end tubular part or cup-shaped part can be produced by impact extrusion. No matter how intricate, if it can be made as an Alcoa Impact, it is fabricated in one smack in a split second.

If you think you should be considering the possibility of using an Alcoa Impact, send for our helpful design manual, *Alcoa Impacts—Metal in Motion*. If you have a problem you want to talk about right now, call your nearest Alcoa sales office, (you'll find it listed under "Aluminum" in the Yellow Pages of your telephone directory) and an Alcoa sales engineer will be glad to help you out. Aluminum Company of America, 1997-X Alcoa Building, Pittsburgh 19, Pa.

Some Impact Rules of Thumb—

Check your problems against this list:

1. Parts requiring hollow sections—either tube or cup-shaped with one end closed.
2. Parts with walls or surfaces requiring zero draft.
3. Parts requiring lengths up to eight or ten times the diameter.
4. Parts requiring the strength of forgings.
5. Parts requiring tolerances down to ±0.005".
6. Parts requiring ribs, bosses or fins as integral parts.
7. Parts requiring low unit cost in mass production. (Often the savings in machining, fabrication and assembly made by impacts amortize tooling in relatively short runs.)

ALCOA ALUMINUM IMPACTS

YOUR GUIDE TO THE BEST IN ALUMINUM VALUE

NEW! "ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

NOW! YALE G-3 GAS TRUCKS...

WITH FULLY AUTOMATIC TRANSMISSION

GIVE INSTANT POWER FOR SMOOTHER, FAST-CYCLE HANDLING

Automatic Power Control. Full power the instant it's needed for fast starts or climbing grades...for accurate inching while lifting capacity loads at 60 feet a minute. Loads are spotted fast!

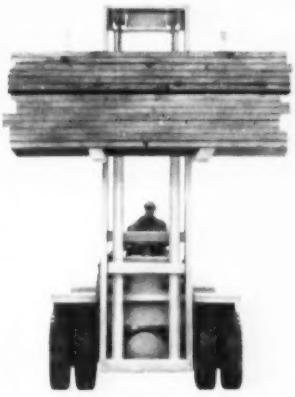
Fast-Cycle Operation. Maximum maneuverability in tight areas. Power steering. Power brakes. Separate inching control. No clutch pedal or shifting of gears. Travel speeds up to 20 MPH. Result: more trips per hour, more volume per day.

Greater Stability. Automatic transmission for smooth starts and travel. Low center of gravity with high underclearance. Fast, controlled lowering. Broad lifting base and side-thrust rollers for extra stability. H-beam side members in frame for extra strength. Large, high-flotation pneumatic tires give good traction anywhere.

Yale G-3 Series High-Capacity Gas and LP-Gas Trucks are designed for attachments, engineered for minimum loss distance. Also available with Fluid Coupling or standard transmission.

EXCLUSIVE YALE "WIDE-ANGLE VISION"

300% more visibility than any other truck of its type! Wide spacing of channels, lifting chains and hoisting cylinders, and open-design carriage give maximum forward visibility *plus* wide arc of vision for fast, safe handling of big loads.



CAPACITIES: 15,000 to 20,000 LBS.

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The Yale & Towne Mfg. Co., Yale Materials Handling Division
Manufacturing Plants: Philadelphia, Pa.; San Leandro, Calif.

Gasoline, Electric, Diesel & LP-Gas Industrial Lift Trucks
Worksavers • Warehousers • Hand Trucks • Hand and Electric Hoists

The YALE & TOWNE Manufacturing Company,
Dept. A-9411, Roosevelt Boulevard, Philadelphia 15, Pa.
Please send me brochure No. 5230A about the new Yale High-Capacity Gas Trucks.

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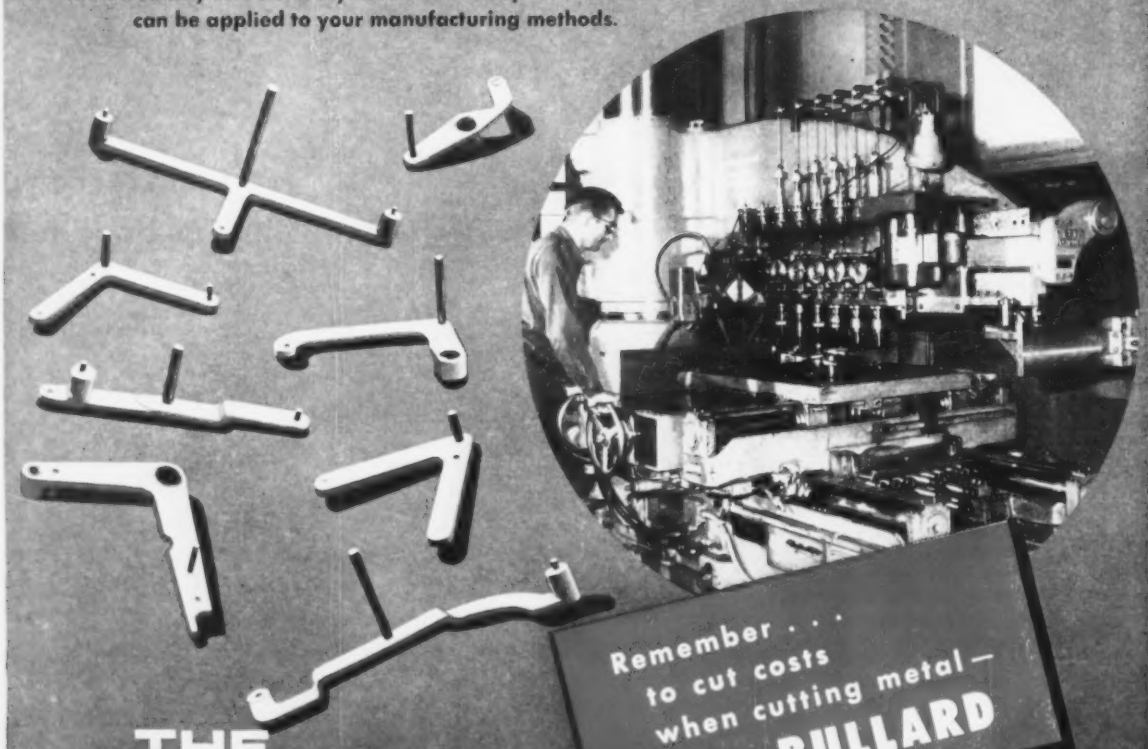
In Canada: write The Yale & Towne Manufacturing Co., St. Catharines, Ontario, Canada.

...AN 8 TO ONE SAVING WITH BULLARD Spacer Table

is obtained by the Daystrom Instrument, Division of Daystrom Incorporated, Archbald, Pa., on drilling and boring various sized holes with diameter tolerances of ±.0002 and center distances of ±.0005. The major part of this saving is due to eliminating the necessity of making costly drill jigs and boring fixtures for each individual piece or operation. The multiple drill head, with variable speed drive, at Daystrom Instrument, is set up to drill and bore three different diameters on as many as fourteen holes in one set-up. The versatility and accuracy of the Bullard Spacer Table can be applied to your manufacturing methods.



Remember . . . to cut costs when cutting metal— buy BULLARD

THE BULLARD COMPANY

BRIDGEPORT 9, CONNECTICUT

MOLY NEWS

CLIMAX MOLYBDENUM COMPANY, 500 FIFTH AVENUE, NEW YORK 36, N. Y.

Ultra-Strength Steels Boost Tensile Strengths to 300,000 psi.

Ten years ago, engineers considered 180,000-psi tensile strength in steels the maximum they could use safely.

Today, alloy steels with minimum strengths of 220,000 to 300,000 psi are being used commercially. These ultra-strength steels have the ductility and toughness needed for structural applications. At tensile strengths above 220,000 psi, they show more strength per pound of product than high-strength aluminum alloys. And at 260,000 psi, they are approximately 15% lighter than aluminum alloy products of the same strength.

Molybdenum is an essential element in almost all of these steels.

How are the higher strengths and strength/weight ratios of these steels being used? Until recently, they've been utilized almost exclusively in aircraft components, such as landing gear. Now, however, they're being considered wherever weight and space savings compensate for higher fabrication costs . . . as, for example, in equipment that must be moved (portable tools); gears, pulleys, belts, liners; heavy machinery operating at high stresses; machinery where inertia is a design factor; materials-handling equipment, such as cranes; and transportation equipment.

Like to know more about ultra-strength steels and their properties, and the names of manufacturers? For our free booklet, circle #1 on the coupon.

Bulletin Shows How to Get Heat Resistance in Cast Iron

In cast iron, heat resistance can mean different things: resistance to growth, to heat checking, to scaling, or to deformation under load at high temperatures.

"Why Moly Iron? #5" contains a chart showing the specific kinds of heat resistance needed by parts such as brake drums, melting pots, piston rings and so on. This chart also lists the best type of iron to use and the proper alloy additions. A number of detailed case histories document this useful bulletin.

For a free copy of "Why Moly Iron? #5" circle #2.

New Coatings May Solve Moly's Oxidation Problem

The most important obstacle to using molybdenum at high temperatures is being overcome. Oxidation is the problem; at temperatures over 1000F, molybdenum oxidizes rapidly.

Newly developed coatings offer molybdenum the needed protection. Three types are promising:

1. Electro-deposited chromium and nickel layers which protect molybdenum to 2000F.
2. Sprayed coatings of aluminum-chromium-silicon alloys, and nickel-boron alloys, which have proved effective at 2000-2400F.
3. Ceramic and molybdenum disilicide coatings which hold promise of protecting molybdenum from oxidation at even higher temperatures.

Digested from "Protecting Molybdenum at High Temperatures" by Julius Harwood, Materials & Methods. For reprint of entire article, circle #3.

Booklet Deals with Molybdenum Joining Techniques

Recent progress in joining molybdenum, and suitable means for protecting it from oxidation, are opening up new uses for molybdenum and its alloys in structural components for high-temperature service.

"A New Look at Joining Molybdenum" by R. R. Freeman and J. Z. Briggs, both of Climax, analyzes the factors involved in joining moly and discusses the methods available.

For the free booklet, circle #4.

List of Moly Literature Now Available

Copies of more than 30 recent pieces of technical literature on molybdenum are available from Climax Molybdenum Company. *For a free list of these, including titles, authors, sources and 25-30 word summaries, just circle #5.*

Steels for Power-Plant, Refinery Equipment at 900-1100F

Designers of power-plant and refinery equipment who need to select steels for applications at 900 to 1100F will be interested in a copy of "Chromium-Molybdenum and Chromium-Molybdenum Vanadium Steels for power-plant and refinery service up to 1100F."

This paper, presented at the ASME annual meeting by George V. Smith, Bard Professor, Cornell University, appraises literature on the subject and draws some new, objective conclusions.

For a free reprint, circle #6.

New Climax Alloy Proves Unusually Wear Resistant

These liner castings, made of Climax 321, proved highly resistant to wear in our ball mill discharge launders. Severe wear normally occurs in this operation as a result of erosion from the coarse pulp flowing out of the ball mill discharge.

If you need a highly wear-resistant material, you may be interested in our new Climax 321 Alloy. It's a hard, martensitic type of white iron containing nickel, chromium and molybdenum in proportions that are well balanced, both metallurgically and economically.

We've been using 321 Alloy in our own mining operations with exceptional results. Comparative tests in ball mill liners and grinding balls proved its excellent wear-resisting properties.

Because this alloy is relatively new, service results in other applications are not yet available. However, our laboratory studies and data indicate it should prove suitable for the general run of abrasion-resistant castings of the martensitic white iron type—such as wear shoes, sand and dredge pump wearing parts, pug mill knives, mixer liners, etc.

Climax 321 can be melted in a cupola or electric furnace and cast in either sand or permanent (chill) molds. It has a normal hardness range of 55 to 62 Rockwell "C".

Composition: Carbon 3.30-3.60%; Silicon 0.30-0.60; Manganese 0.50-0.80; Nickel 2.75-3.25; Chromium 1.75-2.25; Molybdenum 0.70-1.10; Sulphur 0.15 max.; Phosphorus 0.30 max. *For data sheet, circle #7.*

Climax Molybdenum Company, Dept. 2
500 Fifth Avenue, New York 36, N. Y.

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in service since 1911

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Production-Controlled High-Quality

FLUORIDES

Boron Trifluoride
Hydrofluoric Acid
ANHYDROUS . . . AQUEOUS

The uses for Fluorides are ever increasing. Harshaw Fluoride production also has increased steadily. Shipments of cylinders and tank cars leave our plant daily. If required, you are invited to draw on the knowledge and experience of our staff of technical specialists on Fluorides.

Write for your free copy of M.C.A. Chemical Safety Data Sheet SD-25 on properties and essential information about . . .
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Anhydrous and Aqueous

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1945 EAST 97th STREET • CLEVELAND 6, OHIO
Chicago • Cincinnati • Cleveland • Detroit
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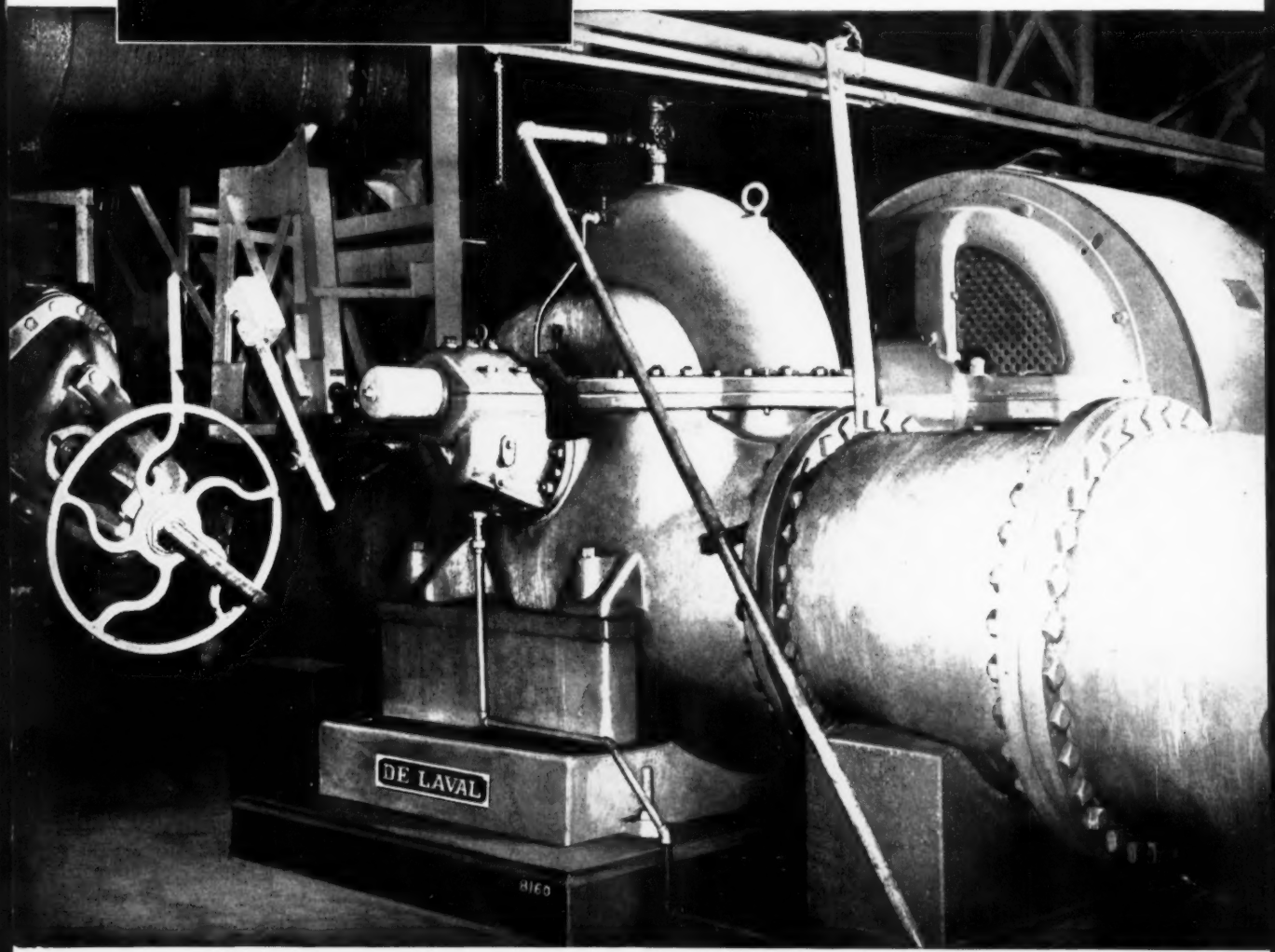
Here is a helpful list of HARSHAW production-controlled high-quality fluorides:

Ammonium Bifluoride
Ammonium Fluoborate
Antimony Trifluoride Sublimed
Barium Fluoride
Bismuth Fluoride
Boron Trifluoride
Boron Trifluoride Complexes
Chromium Fluoride
Copper Fluoborate
Fluoboric Acid
Fluorine Cells
Fluorinating Agents
Frosting Mixtures
Hydrofluoric Acid Anhydrous
Hydrofluoric Acid Aqueous
Hydrofluosilicic Acid
Lead Fluoborate
Metallic Fluoborates
Potassium Bifluoride
Potassium Chromium Fluoride
Potassium Fluoborate
Potassium Fluoride
Potassium Titanium Fluoride
Silico Fluorides
Sodium Fluoborate
Tin Fluoborate
Zinc Fluoborate
Zinc Fluoride

DE LAVAL
CENTRIFUGAL PUMPS

in service since 1911 at Inland Steel Co.



De Laval Centrifugal Pumps have a record of dependability at the Inland Steel Co., which goes back forty-five years. In that time, De Laval has supplied this major producer with pumps for practically every steel mill service—*more than 75 units in all.* The photograph shows one of the largest De Laval pumps on the line at the East Chicago, Indiana plant of Inland Steel. The unit delivers 20,000 gpm at 120 ft head.

De Laval Centrifugal Pumps are available for a wide range of applications in all types of metal-working plants. Types L, M and P single stage double suction pumps can handle capacities from 1,000 to 20,000 gpm and heads to 350 feet. Larger De Laval units of any capacity to meet any requirement for steel mill service are available.

Send for Bulletin 1004 giving performance and application data.

DE LAVAL *Centrifugal Pumps*

DE LAVAL STEAM TURBINE COMPANY
899 Nottingham Way, Trenton 2, New Jersey

DLSB8

Now SIMONDS Offers You

a Fine Grained, Silicon Killed

LOW CARBON
Flat Ground Steel

This new line is in ADDITION to

SIMONDS FLAT GROUND DIE STEEL

High Grade Alloy Tool Steel
(Oil Hardening — Air Hardening)

Here's a fine-grained, forging quality, silicon-killed steel that opens up the way to important savings on items like jigs, fixtures, patterns, stripper plates, punch pads, die plates, die-blocking shims . . . *and parts that don't require heat treatment or in some instances, just case-hardening.*

This new line of low-cost, LOW-CARBON Flat Ground Steel rounds out the present Simonds line of Oil Hardening and Air Hardening Die Steel. What's more, it has equally fine finish . . . and is made to the same close tolerances, with excellent welding quality and machineability.

Simonds LOW-CARBON Flat Ground Steel is furnished in a wide range of flats from 1/16" to 1 1/2" thick and 1/2" to 16" wide, and in squares from 3/8" to 2 7/8". All sizes come in standard, ready-to-use 24" lengths, individually packaged. Stock sizes are ready now . . . special sizes on order. *Get full details from your Simonds Distributor today.*

TYPICAL CHEMICAL ANALYSIS

C. .18	Mn. .50
Si. .20	Phos. & Sul. .04

Heat Treatment By
Case Hardening Only

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

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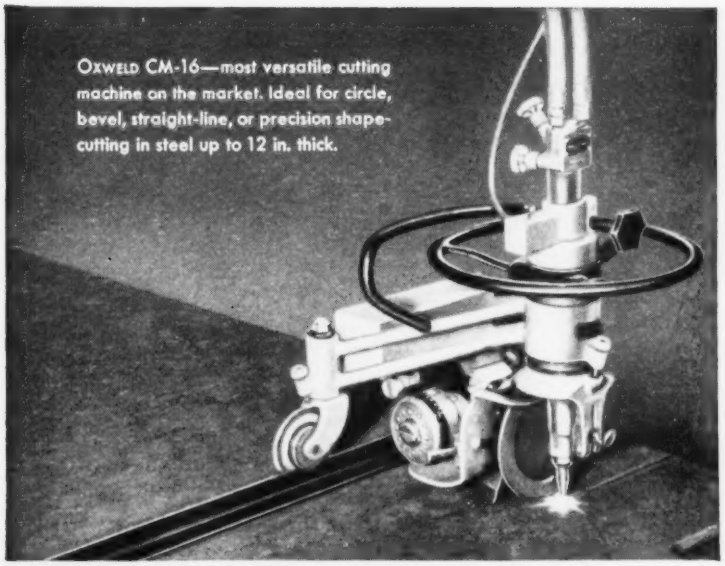
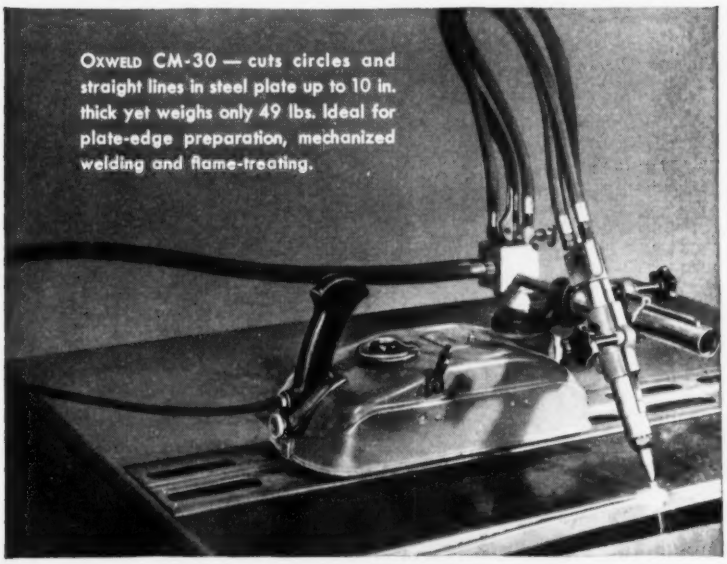
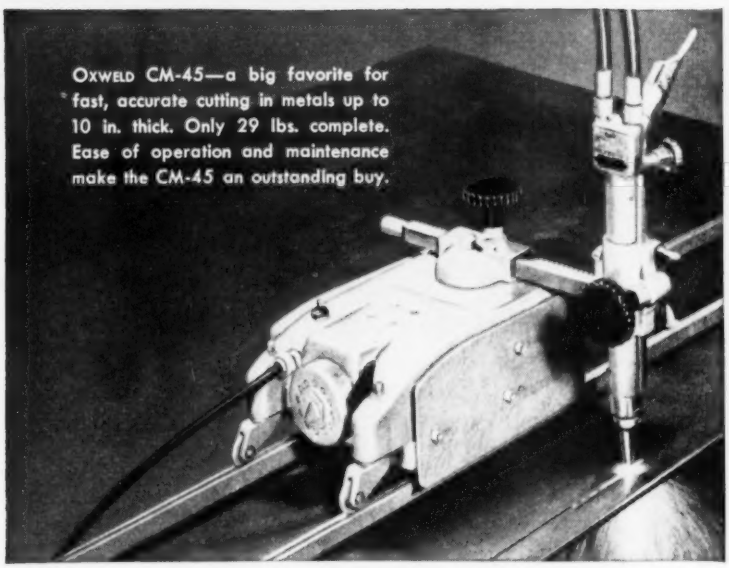
Peace Steel Co., Newcomerstown, Ohio
Simonds Abrasive Co., Philadelphia, Pa., and Arvida, Que., Canada



OXWELD CM-16—most versatile cutting machine on the market. Ideal for circle, bevel, straight-line, or precision shape-cutting in steel up to 12 in. thick.



OXWELD CM-30 — cuts circles and straight lines in steel plate up to 10 in. thick yet weighs only 49 lbs. Ideal for plate-edge preparation, mechanized welding and flame-treating.



OXWELD CM-45—a big favorite for fast, accurate cutting in metals up to 10 in. thick. Only 29 lbs. complete. Ease of operation and maintenance make the CM-45 an outstanding buy.

cutting holes in production costs

OXWELD

Trade-Mark

PORTABLE CUTTING MACHINES

Here's the modern, efficient way to slash maintenance and production costs —*mechanized* flame-cutting with OXWELD Portable Cutting Machines. These versatile machines offer you a matchless combination of speed, production-line accuracy, and low-cost operation — a combination that adds up to greater savings for you on every cutting job.

And like every OXWELD product, OXWELD Cutting Machines are backed by half a century of experience and know-how . . . your guarantee of peak performance and quality results.

Ask your nearby LINDE representative to show you the *complete* line of dependable OXWELD Portable Cutting Machines —or write for free catalog F-4487. Do it today!

LINDE COMPANY

DIVISION OF

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WAGNER ELECTRIC MOTORS . . . THE CHOICE OF LEADERS IN INDUSTRY

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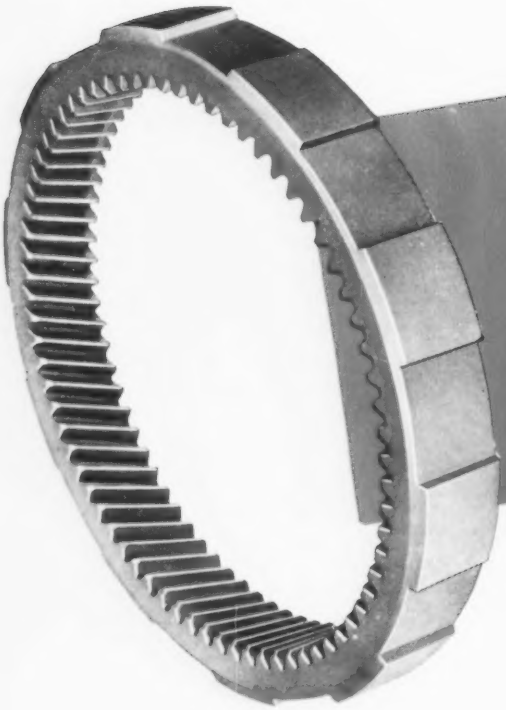
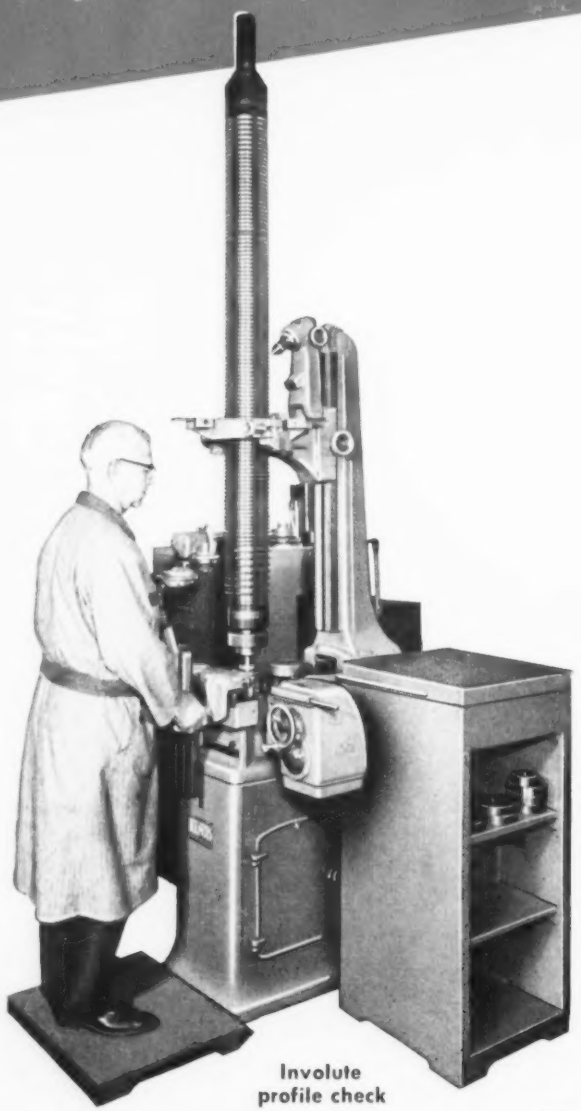


WHY YOU GET BETTER HIGH SPEED INTERNAL GEARS AT MINIMUM COST WITH RED RING NALOY BROACHES

- Gear is completely cut from the solid blank in just one pass. A quick shaving operation or a finish broaching pass completes it.
- Critical gear characteristics held to tolerances of .0002".
- All gears produced are interchangeable regardless of the number of broaching tools in use.

The secret of combining spectacular economy with such high gear precision lies in the broaching tools themselves. Special manufacturing processes are used. Each is under the constant control of Red Ring metallurgists and engineers in this company's own plant.

The real proof of Red Ring methods is reflected in actual performance figures. Ask to see them.



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7680

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ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

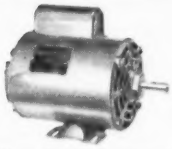
WAGNER ELECTRIC MOTORS...THE CHOICE OF LEADERS IN INDUSTRY

Reduce Down Time—Power your Equipment with *Dependable* Wagner Motors

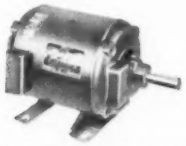
Sixty-six years of experience goes into the building of Wagner Motors. Their reputation for reliability, their electrical characteristics, price and prompt delivery make them a sound choice for your equipment.

Whatever your motor requirements may be—single-phase or polyphase... ⅙ or 500 horsepower—Wagner can offer a standard motor that is entirely dependable in its specific application. A few of the many motors in the Wagner line are shown below.

FRACTIONAL HP



TYPE RK — Capacitor-start Induction. For general purpose applications. Single-phase. Rigid or resilient mounting. 48 frame: ⅙ or ¼ hp. 56 frame: ⅓ through ¾ hp. Also available in integral ratings through 5 hp.



TYPE RA — Repulsion-start Induction. For general purpose applications. Single-phase. High starting torque—low starting current. ⅙ through ¾ hp. Also available in integral ratings through 15 hp.

TYPE RB — Split-phase Induction. For easy starting applications. Single-phase, resilient mounting. 48 frame: ⅙, ¼ or ⅓ hp.

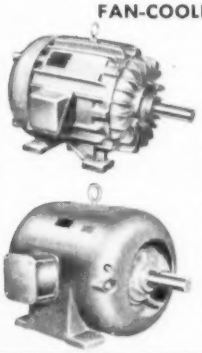
TYPE RP — Polyphase Squirrel-cage Induction. General purpose, normal torque. 56 frame: ¼ through ¾ hp.

INTEGRAL HP

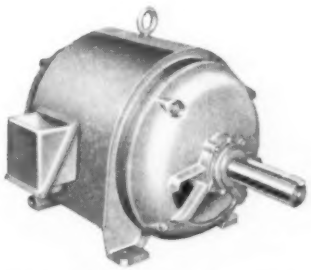
DRIP-PROOF

TYPE DP— Squirrel-cage Induction, corrosion resistant cast iron frames. 1 through 125 horsepower.

TOTALLY ENCLOSED FAN-COOLED



TYPES EP AND JP Standard and explosion-proof. Squirrel-cage Induction, corrosion resistant cast iron ribbed frames, 1 through 30 hp—smooth frames, 40 through 250 hp.



OPEN TYPE POLYPHASE SQUIRREL CAGE

TYPE RP—Drip-proof. Suitable for all general purpose applications. Available in ratings 150 through 500 hp.

OTHER WAGNER MOTORS

In addition to a complete line of standard motors, Wagner also furnishes Increment Type Motor and Starter Combinations... Wound Rotor Polyphase Motors... Jet Pump Motors... Vertical and Flange Mounted Motors... Hermetic Motors... Gear Motors and Direct-Current Motors. Consult the nearest of our 32 branch offices, or mail coupon today for full information on the complete Wagner line.

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SERVING INDUSTRY SINCE 1891

M57-10A

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Please send Bulletin MU-185 on your complete line of Motors.

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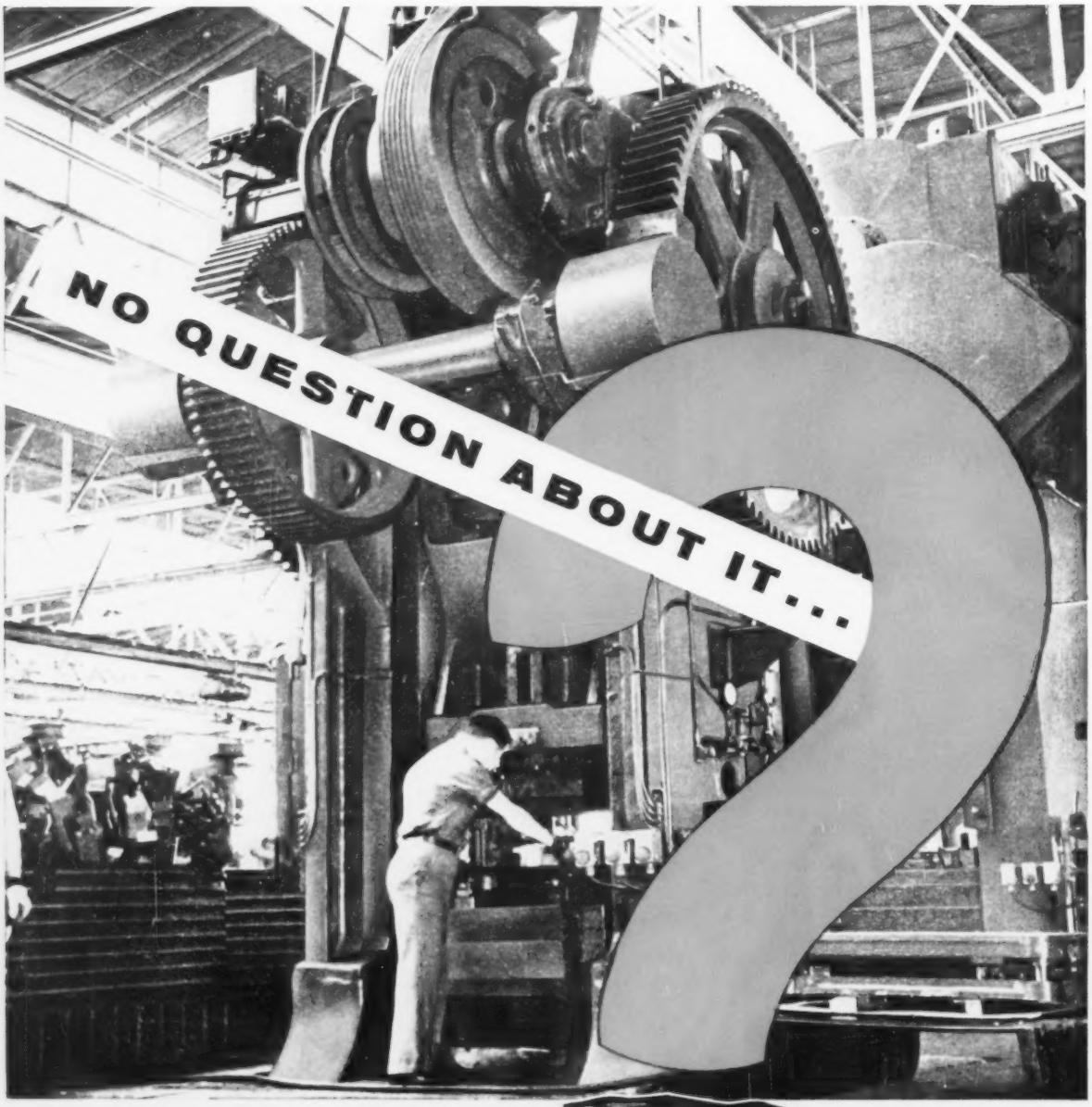

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How A. O. Smith Corporation makes a "Diagonal Tie" with USS GERRARD Round Steel Strapping

This unique diagonal tying method was designed by the Plant Superintendent of the Welding Products Division, A. O. Smith Corporation, Milwaukee, Wisconsin, in cooperation with a USS Gerrard sales representative.

Intricate-looking enough to be nicknamed the "Diagonal Tie," the method is actually very simple and has proved ideal for securing corrugated boxes of welding electrodes. The USS Gerrard Round Steel Strapping not only acts as a perfect closure but reinforces the box so that it will not tear when one end is lifted. In addition to preventing box damage and lost pieces, the "Diagonal Tie" makes a very favorable impression on customers.

The "Diagonal Tie" is made on the Gerrard Model Q Semi-Automatic Machine. A. O. Smith's Welding Products Division has been using USS Gerrard Steel Strapping for over ten years.

You, too, can receive the time- and money-saving advantages that USS Gerrard has to offer. No matter what your packaging-shipping problem is, we'll come up with a practical solution. Contact a USS Gerrard Sales representative for any help you need.

THE DIAGONAL TIE

NEW CATALOG—HOT OFF THE PRESS!

36 pages of photographs, description, facts and figures on all USS GERRARD Steel Strapping and associated equipment.

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UNITED STATES STEEL

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He moves a 30-oz. lever; the Gerlinger moves 30,000 lbs.

Where extra power is needed to lift, move and stack capacity loads up to 40,000 pounds, Gerlinger giants like this one do the job like no other fork lift trucks built. And do it with instant fingertip control!

More and more industrial plants, mills and foundries are finding out that top production and profits go hand-in-hand with the mass-handling efficiency you get with a job-proved Gerlinger.

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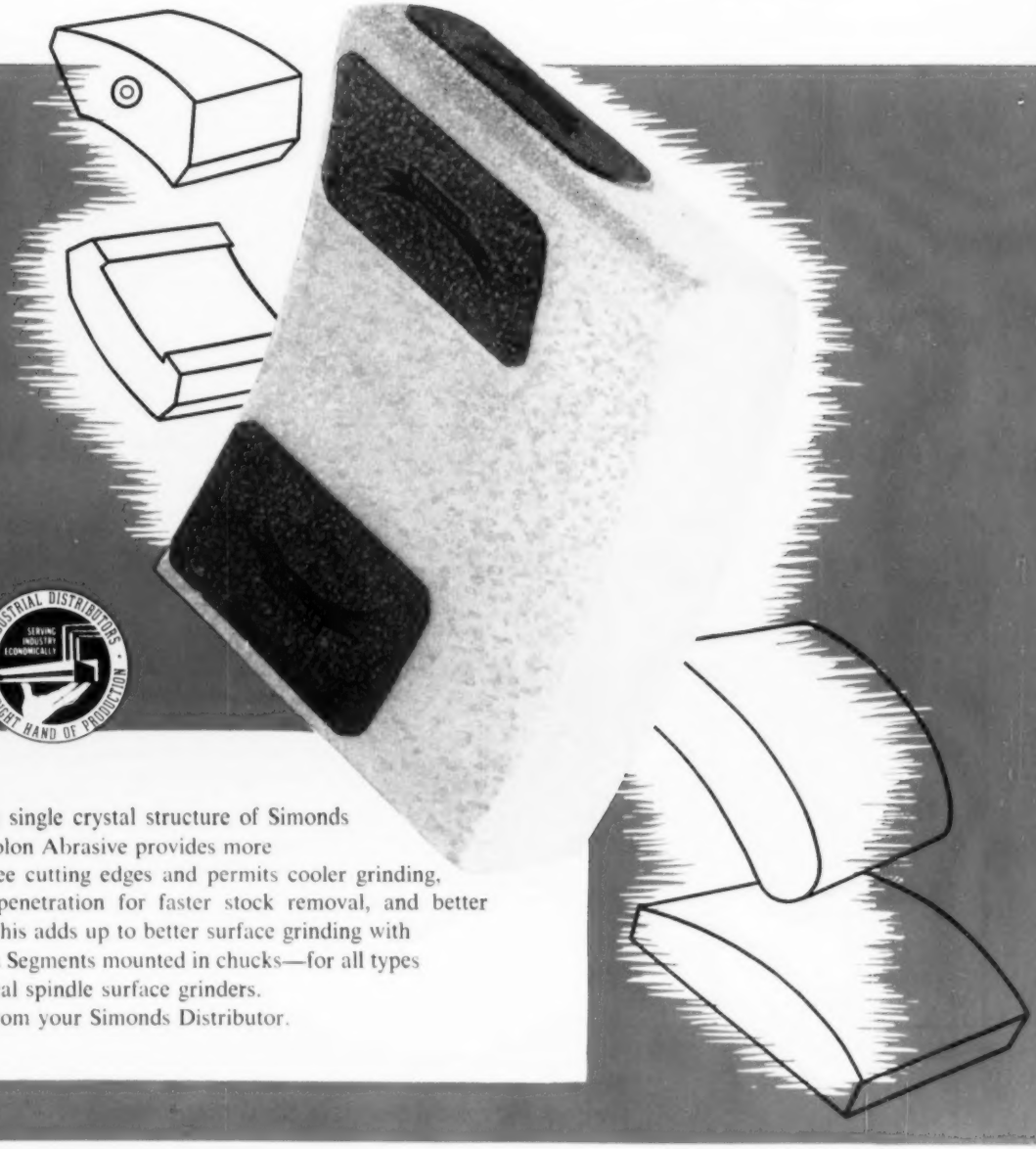
with SA Borolon® TRADE MARK . . . for faster cooler grinding . . .



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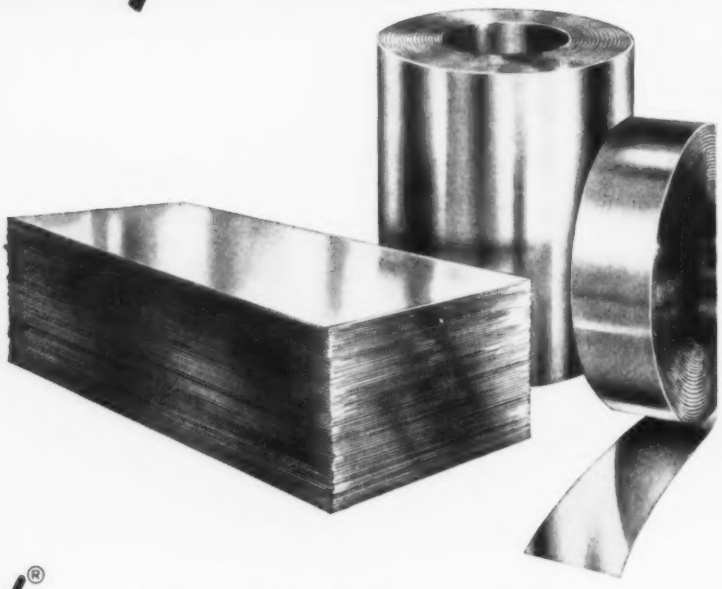

when you order

MicroRold® Stainless Steel Sheet & Strip

SPECIFICATIONS	WIDTH	THICKNESS
SHEETS	up to 36″	.005 to .109
	up to 48″	.010 to .109
STRIP	up to 23 15/16″	.0015 to .009
GRADES:	201, 202, 301, 302, 304, 305, 316, 321, 347, 403, 410, 430 and Micro-Mach (special extra-high-tensile aircraft grade)	

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BAR AUTOMATICS

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All slides are wide and heavy, providing maximum support without overhang.

The NEW 7/16" SIX

...gives you

1. wide tooling versatility
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Built to meet the demand for a smaller faster multiple, the new 7/16" RA-6 machine has taken its place in the Acme-Gridley line—chosen by production men who daily prove the advantages of National Acme's "complete line" experience to furnish the right machines for the job.

Write for your copy of Bulletin MRA-56 which illustrates and describes the new 7/16"-Six.

National Acme

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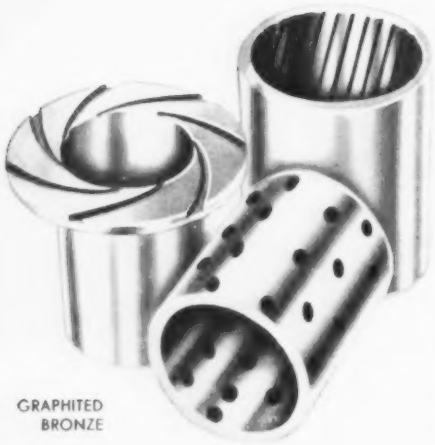
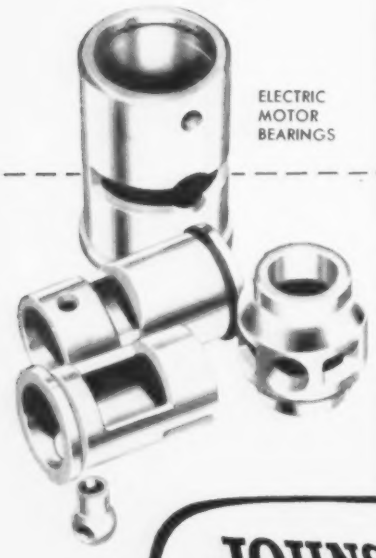


GRAPHITED BRONZE

GENERAL PURPOSE

UNIVERSAL BRONZE BARS

LEDALOYL SELF-LUBRICATING



ELECTRIC MOTOR BEARINGS

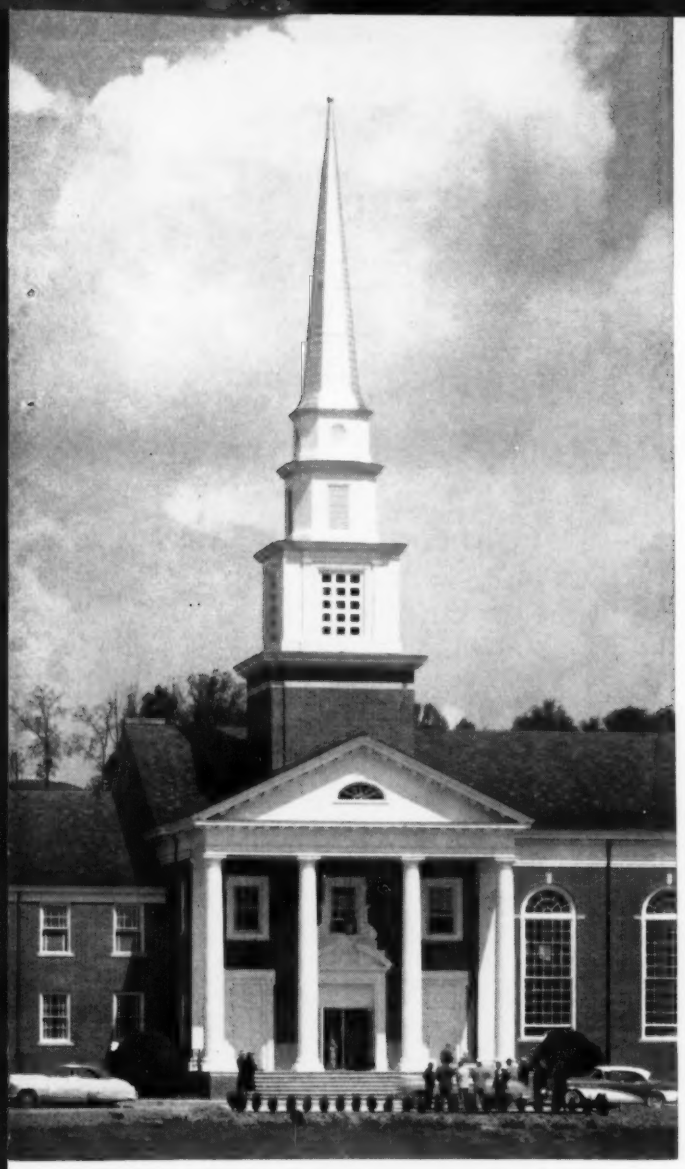
Over 2300 types and sizes of bearings and bars in stock

Johnson Bronze can supply over 1900 sizes and types of sleeve bearings, and over 400 sizes of bronze bars from stock. This includes standard stock GP bearings, graphited bearings, Ledaloyl self-lubricating bearings, and electric motor bearings made to motor specifications. You can select an economical standard bearing for almost any application from this large stock. For complete details on how Johnson Bronze stock bearings can save you money, contact your Johnson distributor.

Johnson Bronze

505 South Mill Street • New Castle, Pa.

JOHNSON Bearings



NOTHING *can equal*
Stainless Steel
in its unique combination of properties

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength, hardness, beauty, cleanability and easy fabrication. If you're looking for a reliable source of supply, remember that United States Steel offers you the widest range of types, finishes and sizes.

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USS STAINLESS STEEL

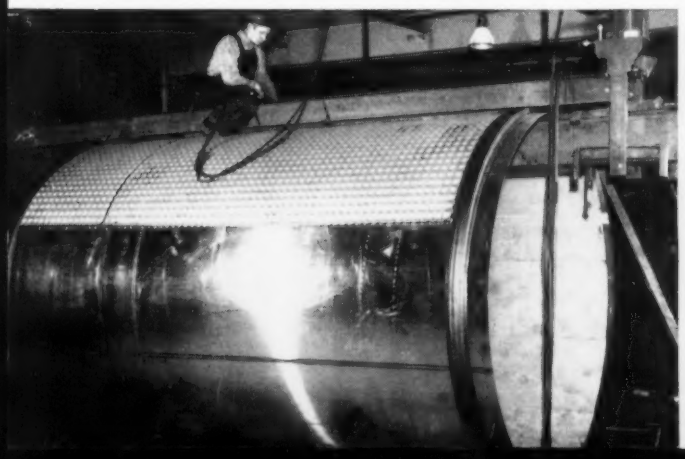
SHEETS • STRIP • PLATES • BARS • BILLETS
PIPE • TUBES • WIRE • SPECIAL SECTIONS

UNITED STATES STEEL

FOR BEAUTY. Stainless Steel shingles in diminishing sizes create a beautiful, gleaming steeple for the State Street Methodist Church in Bristol, Virginia. Architect Allen Dryden, of Kingsport, Tenn., specifies Stainless Steel for jobs like this to assure lasting beauty, protection from weather and freedom from maintenance. This spire is sheathed in Type 302 26-gage Stainless Steel, and the cross is built of Type 302 Stainless bars. Construction details were engineered by Overly Manufacturing Company, Greensburg, Pa., who also fabricated and erected the steeple.

FOR FLEXIBILITY OF DESIGN. In this "Cold-Zone" cooling-storage milk products tank, made by Damrow Brothers Company, Fond du Lac, Wisc., Type 304 10-gage Stainless Steel was used for the smooth, easy-to-clean inner wall. Again Stainless Steel—this time Type 304 16-gage—was used for the dimpled outer wall which is stave-welded to the inner shell. This unusual design of dimple size and arrangement gives proper baffling and velocity to the refrigerant as it passes through the cooling area. Stainless Steel provides greater sanitation, durability, long life, strength and—the flexibility necessary to make this design possible.

FOR DURABILITY. The Master Combination Padlock, designed for school locker room use and built by Master Lock Company, Milwaukee, Wisconsin, features a double-case construction—with Type 430 Stainless Steel used for the outer case. This Stainless Steel design makes it one of the strongest padlocks available. In addition to increasing the lock's durability, Stainless Steel also adds to its sales appeal and to its resistance to the corrosive atmospheres of damp locker rooms. The springs, too, are made from USS Stainless Steel—Type 304 Ameroxide coated wire.



Graph-air®

New, tougher tool steel air-hardens at temperatures as much as 400° lower... machines faster

THIS new tool steel—Graph-Air®—air-hardens at temperatures as much as 400° lower than other air-hardening tool steels. Temperature as low as 1450° F. is sufficient. This means simpler heat treat control, less distortion.

Because of its graphitic structure, Graph-Air machines faster. And there's less decarburization than with other air-hardening steels. Longer life, because the uniform, diamond-hard carbides in its structure help Graph-Air outwear other tool steels. And you get longer-lasting accuracy, because of Graph-Air's built-in stability. Graph-Air is fully as stable as other Timken Company graphitic tool steels, the most stable ever made.

Graph-Air's uniformity of hardening plus minimum distortion make possible more intricate sections. You'll find it a better-than-ever answer for blanking dies and other steel parts that must withstand hard abuse.

For your jobs requiring a high quality, lowest-temperature air-hardening tool steel, specify Graph-Air. Available in solid and hollow bar sizes. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

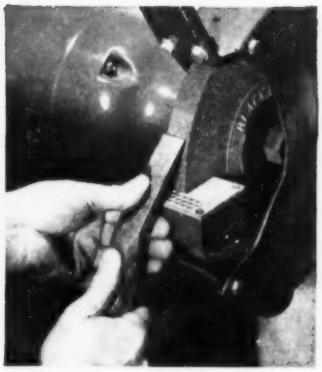
TIMKEN *Fine Alloy* **STEEL**

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS STEEL TUBING

See the next Timken Televent hour, "The Innocent Years" over NBC-TV, Thursday night, November 21st.

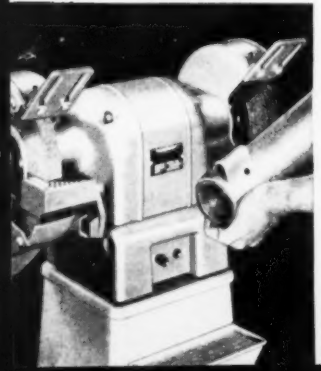
Four models...one tailor-made for your work!

PUSH-BUTTON SAFETY SWITCH! 2 pole push-button switch is recessed for your protection, but is easily accessible.



ADJUSTABLE U-SHAPED TOOL REST: Gives full support. Can be adjusted for wheel wear. Perforations stop dirt accumulation.

4 VERSATILE MODELS, 4 POWERFUL MOTORS! 6" through 10" wheel diameters. From ¾ to 1 hp. Each has additional advantages.



Swifty Service says, "Factory-trained technicians at local B&D Factory Service Branch keep B&D Tools in top operating shape."

Smooth-running Black & Decker Bench Grinders are POWER-BUILT for continuous peak performance!

Choose one of the four Black & Decker Bench Grinders and you're sure to get top quality tool sharpening, wire brushing, grinding, buffing.

The smooth-running Black & Decker-built motor is designed to give constant speed, regardless of load. Extends life of wheel, causes less overheating. Lubricant-sealed ball bearings protect against abrasive damage. Adjustable tool rests, adjustable spark shields, and built-in exhaust outlets make for safer, easier operation.

Be sure to see the B&D Exhibit at the National Metal Exposition in November.

In the meantime, for a free demonstration, call your local distributor today. For a free catalog write to: THE BLACK & DECKER MFG. CO., Dept. 0911, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

Look Under TOOLS-ELECTRIC in Yellow Pages

Leading Distributors Everywhere Sell

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Quality Electric Tools—Power-built to set the pace

from cold strip to finished tubing
IN SECONDS!
with a YODER
ELECTRIC-WELD TUBE MILL

One of the fastest . . . and one of the least expensive . . . methods of making steel tubing is with a Yoder Electric-Weld Tube Mill. The Yoder method eliminates the need for time-consuming heat treatments and costly conditioning furnaces for most tube needs. Scrap losses, too, are far lower than any other method . . . usually less than 2%.

The Yoder Type-M Mill shown above is operated by one man and a helper. Coiled strip on this mill is continuously cold-roll formed, welded and cut to required lengths in a matter of seconds . . . at speeds up to 340 f.p.m. The quality of the resulting tube is *constantly* better than the requirements of commercial standards. This is one of many reasons why manufacturers and users of tubing the world over are using more Yoder mills than all other makes combined.

If your business requires pipe and tubing, ferrous or non-ferrous, in sizes from ¼-inch to 26-inch diameter, Yoder can supply the engineering service and machines to produce it faster and better for less! For complete details, write for the Yoder Tube Mill Manual. It's yours for the asking.

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5510 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING **YODER** MANUFACTURING

PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES

AMBALLOY...A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS

STEEL PLATES...AT SIZES AND STRENGTHS TO SUIT YOUR NEEDS

Have a plate problem?

Tell us what it is. Let us know what you need in the way of structural quality, wear resistance, or special alloy composition. Then leave the rest to Byers.

We'll speed your order from mill to job site, with special attention to your deadline commitments. Various grades of Byers carbon, alloy and stainless steel plates, with the AMBALLOY stamp of quality, wear well in ships, trucks, railroad cars, automobiles, agricultural tools, conveyor and mining equipment. There's a list as long as your arm.

Cost control and an ever-increasing range of plate sizes make us competitive on any order. Write or call us—today—for the name of the Byers metallurgist nearest you. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

A growth company with the emphasis on quality and service **A. M. BYERS COMPANY**

For The *Best Cut*, The CORRECT KNIFE CLEARANCE Must Be Used

Steelweld Shears are available for all thicknesses of steel to 2 inches and for lengths to 30 feet. Electric foot-switch operation, as illustrated, is furnished as standard equipment.

In 10 seconds the knife clearance on Steelweld Shears can be adjusted to suit the thickness of metal being cut. It's merely a matter of turning a hand crank until the gauge pointer is on the proper figure.

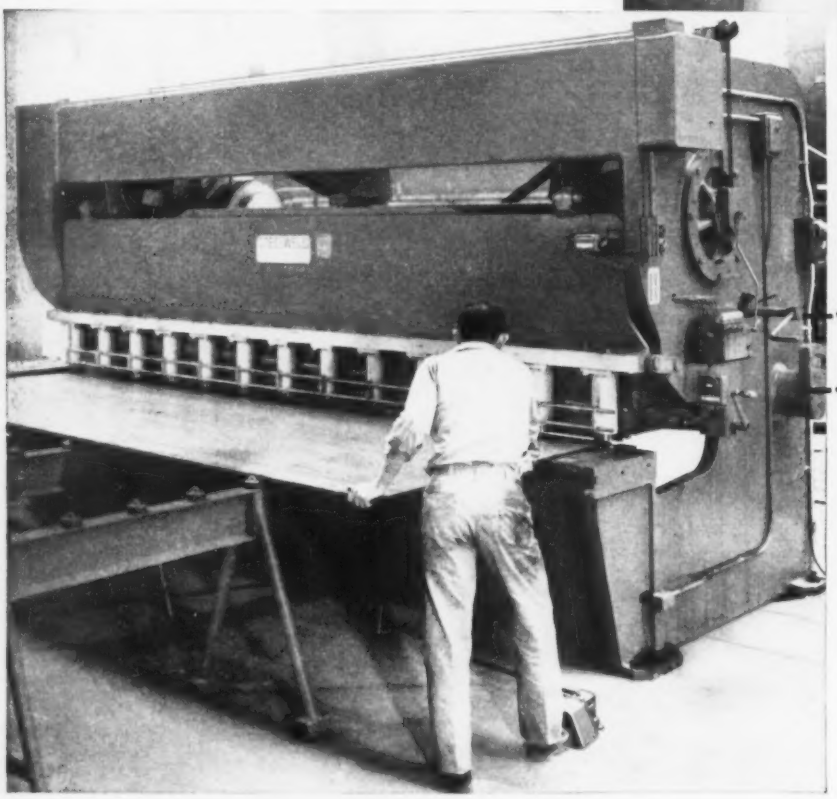


Table of Recommended Knife Clearances

Gauge	Steel	Stainless
10	.012	.007
8	.014	.009
3/16	.016	.010
1/4	.021	.014
5/16	.027	.018
3/8	.032	.022
1/2	.043	.029
5/8	.053	
3/4	.064	
7/8	.075	
1	.086	

FOR every plate thickness there is a definite space or clearance between the knives that will produce the best result. When cutting different thicknesses of metal, it is necessary to vary the knife clearance accordingly.

One of the important differences between Steelweld Pivoted-Blade Shears and all others is the ease with which the knife clearance can be adjusted on Steelwelds. With most shears this is a major operation involving the use of measuring devices and requiring a great deal of time. Steelwelds were designed to make this adjustment simple, easy and fast. Hours of work are not required, in fact, the adjustment for any plate thickness can be made in 10 seconds.

Obviously there is no need to shear with some compromise knife clearance setting when you have a Steelweld Shear. You do not have to accept any average cut when with such little effort you can have the best possible cut every time—sharp, straight, accurate with minimum burr. And then, too, remember that knives stay sharp longer when the proper clearance is used.

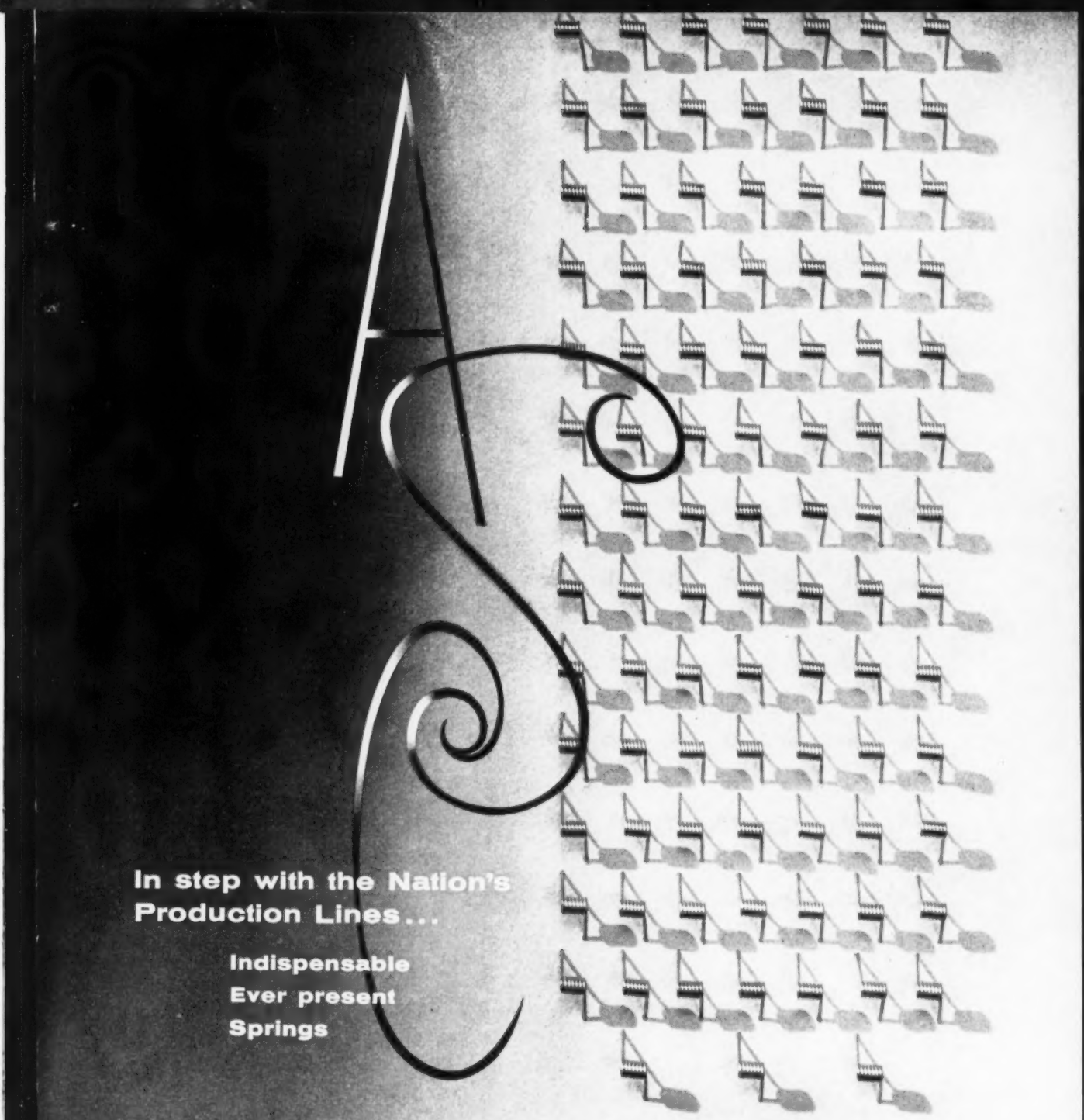
Easy knife adjustment is only one of many fine features that you will like in Steelweld Shears. For all thicknesses of plate up to 2 inches, for all lengths to 30 feet, you will find Steelwelds have much to offer.

Write for free copy of Catalog No. 2011.
Gives construction and engineering details

STEELWELD

PIVOTED BLADE **SHEARS**

STEELWELD DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4855 E. 282 ST. • WICKLIFFE, OHIO



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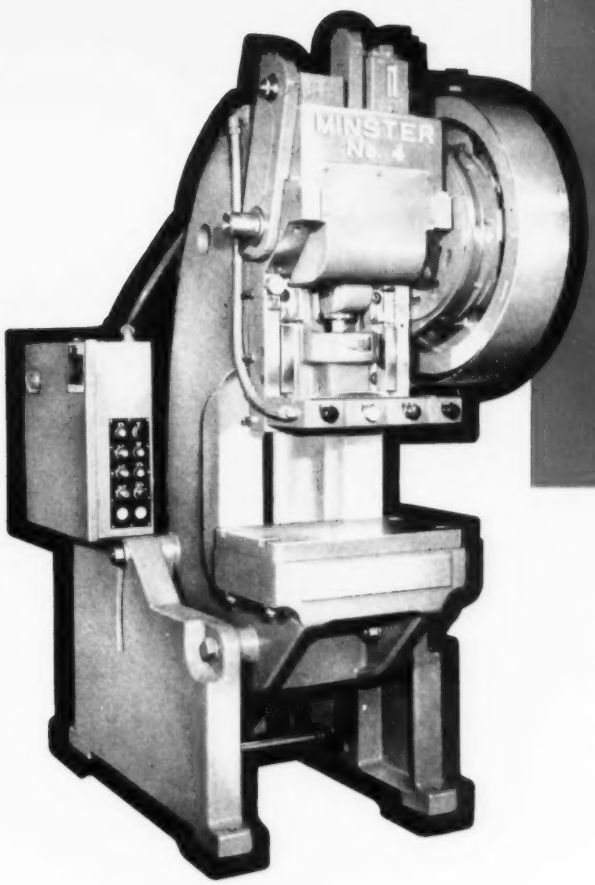


You Helped Design The Improved MINSTER O.B.I.

You, as a press user, have often told us what features *you* wanted in an O.B.I. to improve *your* press operations. Most of the design changes in this improved Minster O.B.I. are based on *your* ideas, desires and demands.

CENTRALIZED CONTROL CABINET CONVENIENTLY LOCATED . . . NEVER INCLINES

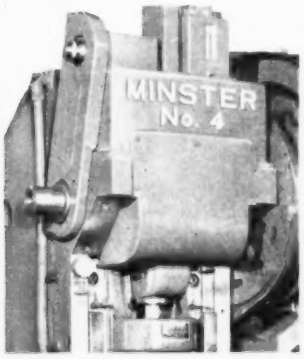
For convenience and better operation, control cabinet mounted on leg remains vertical when press is inclined; is subject to less operational shock and easier to maintain.

NEW LEG DESIGN PROVIDES MORE WORKING SPACE

Square-cut legs give operator more room, a comfortable position in front of press. Inclining mechanism in leg and use of movable spacer rod provide more free space under press for tote pans or conveyors.

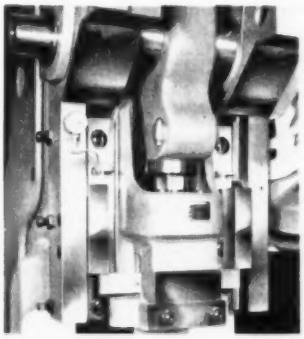
NUMBER	4	5	6
TONS CAPACITY	32	45	60

Flywheel or geared type. Drive can be mounted on either side. MINSTER patented Combination Air Friction Clutch and Brake Unit mounted within flywheel or drive gear on crankshaft.



HEAVIER FRAME FOR GREATER RIGIDITY, ACCURACY AND DIE LIFE

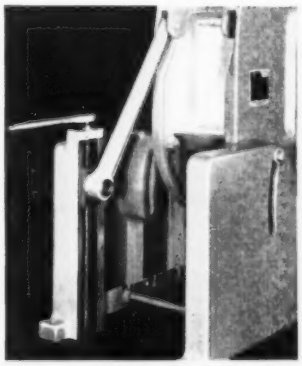
Frame closed in on top and front completely encloses bearing caps, thus providing better distribution of work forces. Connection cover keeps press cleaner—no oil drops hit operator.



GREATER CONNECTION STRENGTH — IMPROVED KNOCKOUT

Tail stock type connection screw locking. Increased connection strength and screw support.

T-Slotted Knockout blocks moving against frame surface give more positive knockout, are easier to adjust. No more bracket breakage.



FASTER, EASIER INCLINING

Inclining the press takes less time and labor with ratchet-wrench-operated mechanism located in press leg *at normal working height*. Die changes are made quickly in vertical position with greater safety, more accurate alignment and less die change-over time.

THE MINSTER MACHINE COMPANY • MINSTER, OHIO

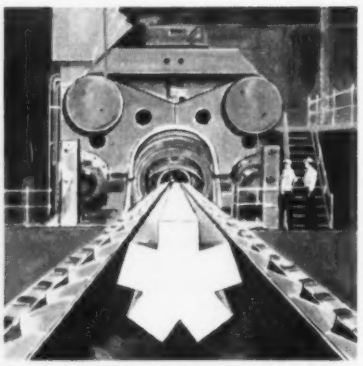
See this Exhibit of

ADVANCED METALS PROCESSING

New methods for improved quality and lowered costs

Pouring an ingot from an electric furnace

Billet entering giant extrusion press



Extrusion press produces varied shapes.

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- ★ Designers
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- ★ Power
- ★ Petrochemical
- ★ Ordnance
- ★ Piping Fabrication
- ★ Chemical Processing
- ★ Turbine Manufacture
- ★ Aircraft
- ★ Missiles
- ★ Automotive
- ★ Truck, Tractor and Farm Equipment
- ★ Materials Handling Equipment
- ★ Construction

By Invitation

For your convenience and comfort, this demonstration is not being opened to the general public. If you wish to see the exhibit, but have not received an invitation, please present your card, indicating your business affiliation and address, at the special reception desk at the entrance to the Waldorf Suite.

Waldorf Suite at the Waldorf-Astoria, New York City

November 18 . . . from 3:00 p.m. to 9:00 p.m.
November 19-20-21 . . . from 10:00 a.m. to 9:00 p.m.

Learn about new processes used to fabricate vacuum melted high purity alloys, stainless steels, super-alloys, titanium and other advanced metals to meet the critical requirements of tomorrow's power, nuclear, chemical, oil refining, missile and other applications.

See dramatic exhibits of tubular products and shapes extruded from stainless and chrome moly steel alloy ingots that have higher transverse properties, in many cases, equal to the longitudinal properties — of particular importance in pressure retention applications — and a high ratio of tensile properties to ductility. Examine metal products formed from cross extrusions of vacuum melted ingots at a 90:1 reduction ratio, yielding 15% to 100% more in transverse and longitudinal impact strength; up to 100% increase in ductility; and up to 100% increase in fatigue strength.

See super-alloys M-252 and A-286 extruded for high service stresses at 1500 degrees to 1600 degrees Fahrenheit and view new process pinion gears made by Metals Processing Division.

On display will be a scale model of the world's largest horizontal steel extrusion press at Metals Processing Division. You will see impact testers, high temperature tensile testers and stress rupture machines substantiating the improved properties created in wrought and cast products by Metals Processing Division's unusual techniques over a temperature range from minus 40 degrees Fahrenheit to 1600 degrees Fahrenheit.

On display are 90mm gun barrel tubes extruded to save hours of machining, and a 46 ft. long, large diameter, weld-free alloy steel pipe — for power, nuclear, petro-chemical and oil refinery applications. Precision forged and extruded hydraulic cylinders and extruded rocket tube bodies for guided missiles will be exhibited.

Metallurgists will find special interest in the advanced metallurgical techniques. Engineers will find new pathways charted for new products and applications.

An appropriate brochure containing valuable technical data will be distributed at the exhibit.

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Brainard Nationwide Strapping Warehouses

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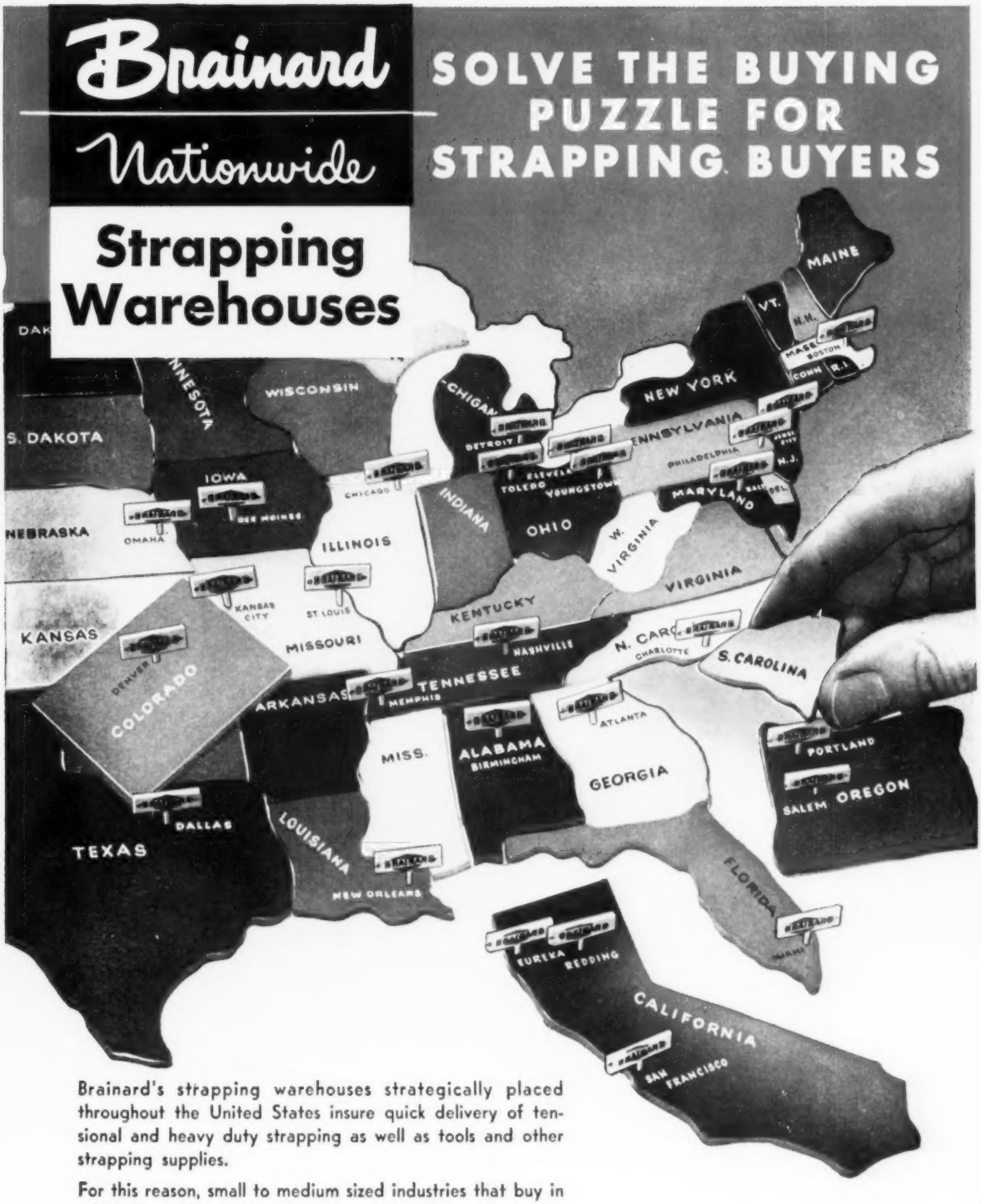

Brainard's strapping warehouses strategically placed throughout the United States insure quick delivery of tensional and heavy duty strapping as well as tools and other strapping supplies.

For this reason, small to medium sized industries that buy in relatively small quantities have found that Brainard's service and delivery are topped only by the quality of their product.

Brainard Steel Strapping

SHARONSTEEL

Brainard Steel Division, Sharon Steel Corporation
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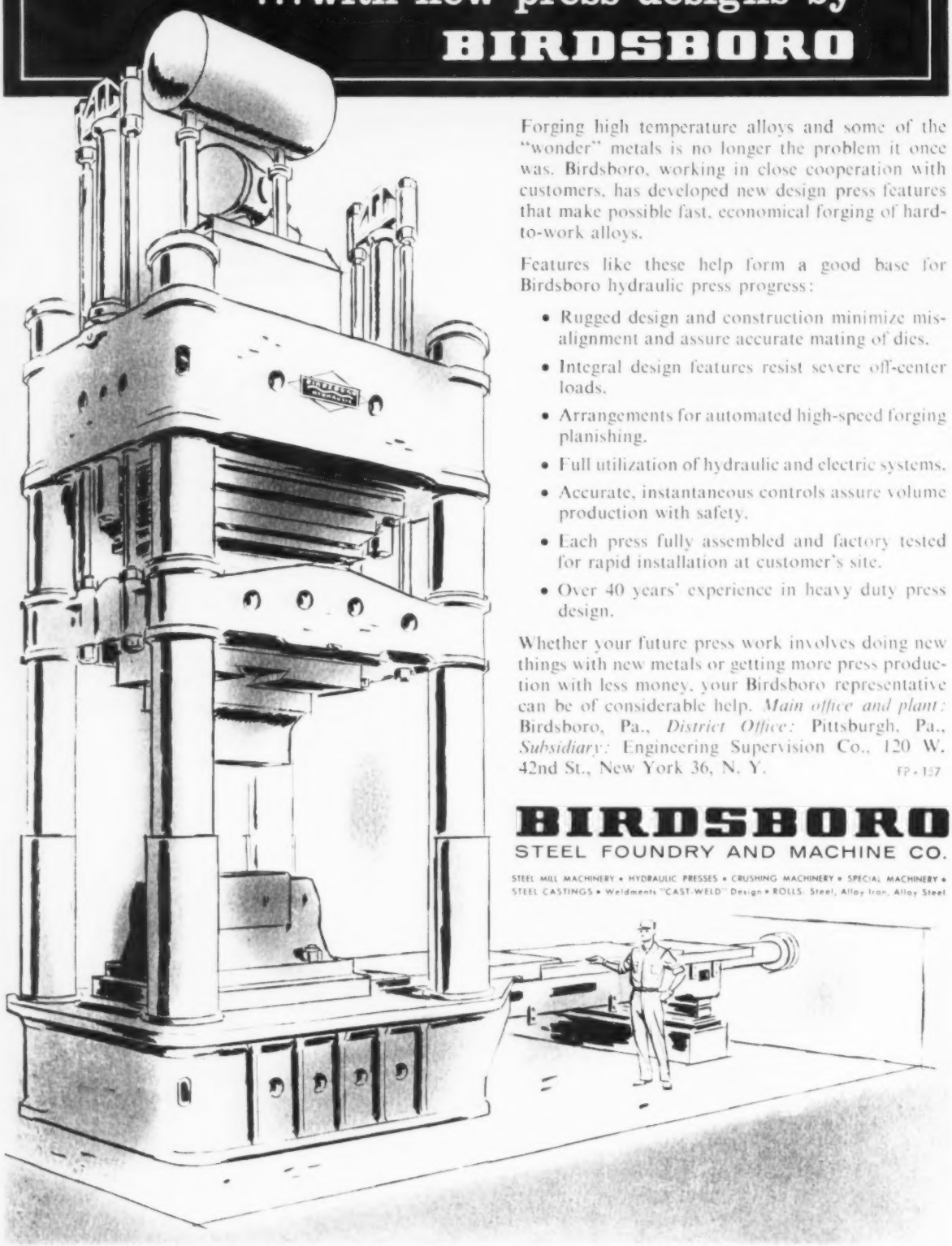
Here's why...

advancing the FORGING FRONTIER ...with new press designs by BIRDSBORO



Forging high temperature alloys and some of the "wonder" metals is no longer the problem it once was. Birdsboro, working in close cooperation with customers, has developed new design press features that make possible fast, economical forging of hard-to-work alloys.

Features like these help form a good base for Birdsboro hydraulic press progress:

- Rugged design and construction minimize misalignment and assure accurate mating of dies.
- Integral design features resist severe off-center loads.
- Arrangements for automated high-speed forging planishing.
- Full utilization of hydraulic and electric systems.
- Accurate, instantaneous controls assure volume production with safety.
- Each press fully assembled and factory tested for rapid installation at customer's site.
- Over 40 years' experience in heavy duty press design.

Whether your future press work involves doing new things with new metals or getting more press production with less money, your Birdsboro representative can be of considerable help. *Main office and plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa., *Subsidiary:* Engineering Supervision Co., 120 W. 42nd St., New York 36, N. Y. FP-157

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Here's why...

Ring Punch & Die, Inc.

JAMESTOWN, NEW YORK

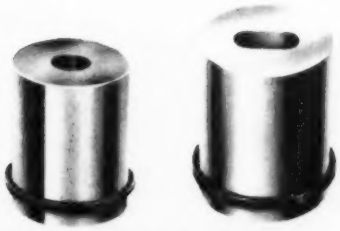
uses Latrobe's

FREE MACHINING HIGH CARBON— HIGH CHROMIUM TOOL STEELS

for Standardized Precision Punches and Dies

TOOL LIFE INCREASED!

Screw machine operation increased from 45 pieces to 80 pieces per hour when machining Latrobe's GSN FM tool steel. In production, the cut-off and form tool life increased over 100% between grinds!



PRODUCTION DOUBLED!

Round hole dies are drilled and taper reamed. Oblong hole dies are milled and counterbored. Again, Latrobe's GSN FM tool steel resulted in savings—production per hour was doubled; cost of drills, end mills and reamers reduced!

EXCEPTIONAL WEAR IN USE!

Exhaustive field tests, conducted by Ring Punch and Die, Inc., have showed that GSN FM punches and dies give exceptional wear in actual production use. No loss of punch life, or chipping, was detected over that normally experienced when punches and dies were made of regular high carbon-high chromium steel without the "free machining" sulphide additives.

GSN FM is an oil hardening high carbon-high chromium steel possessing outstanding non-deforming characteristics in heat treatment. It contains sulphide additives that greatly improve its machinability. These alloy sulphides, as well as the important carbide particles, are evenly dispersed throughout GSN FM by Latrobe's exclusive DESEGATIZED® process of manufacture—your assurance of uniform tool steel quality.

Call your nearest Latrobe representative for complete data on GSN FM and other quality tool steels. A wide range of sizes for immediate delivery stocked at conveniently located warehouses.

Latrobe

STEEL COMPANY

Main Office and Plant: Latrobe, Pa.

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FACTS

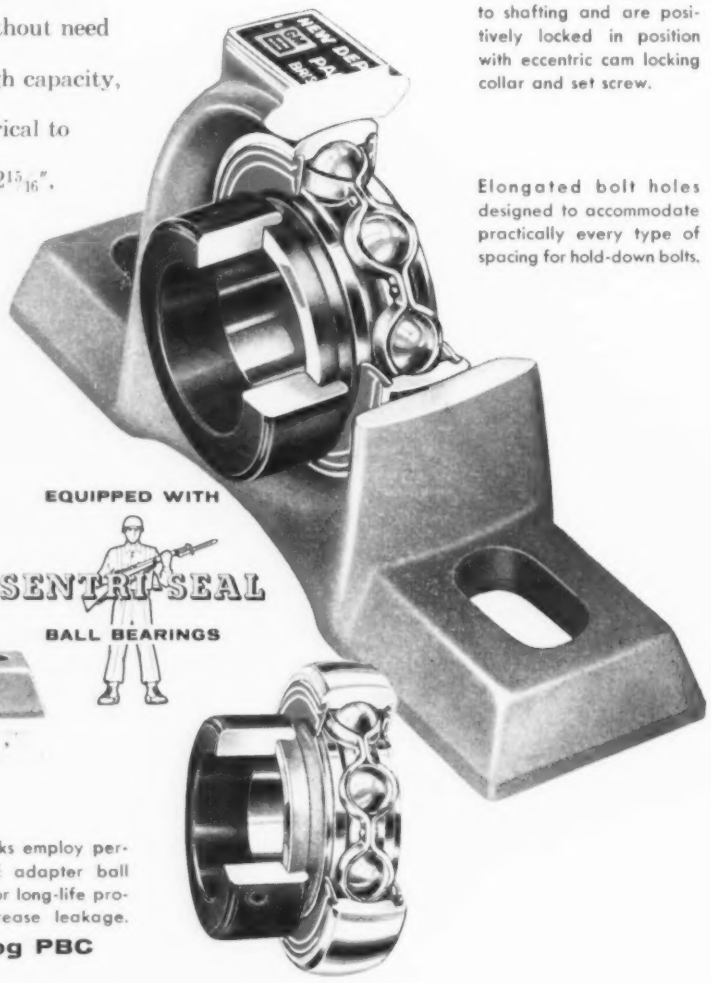
NEW DEPARTURE PILLOW BLOCKS— BUILT FOR LOWEST MAINTENANCE

- New Departure adapter ball bearings are sealed and lubricated for life.
- Design is compact and rigid—fits easily in limited space.
- No grease nipples or other protruding lubricating fixtures needed.
- Pillow blocks are easily mounted without need for any special tools.
- New Departure ball bearings are high capacity, precision-built for long life.
- Bearing and block surfaces are spherical to accommodate any misalignment.
- Thirty-two shaft sizes, $\frac{1}{2}$" through $2\frac{15}{16}$", for wide variety of applications.
- Interchangeable with most other makes of pillow blocks.

Bearings are easily applied to shafting and are positively locked in position with eccentric cam locking collar and set screw.

Elongated bolt holes designed to accommodate practically every type of spacing for hold-down bolts.

Mounting pads are furnished with each New Departure Pillow Block to assure easy interchangeability with all pillow blocks having a high base-to-center dimension.



EQUIPPED WITH

SENTRI-SEAL

BALL BEARINGS

New Departure Pillow Blocks employ performance-proved Type AE adapter ball bearing with Sentri-Seals for long-life protection against dirt or grease leakage.

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1908–1958 GM FORWARD FROM FIFTY

NEW DEPARTURE

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL

Less Steel in Rails

Railroad researchers have developed a new 106-lb rail section which is far lighter and less expensive than track sections now in use. Now being tested in actual service, sections are said to be sturdy enough to support modern diesel engines. Old-time track was required simply to hold up under the rough pounding from heavyweight steam locomotives.

No Place for Hot Hands

Use of eddy current detectors is stepping up quality inspection of the inside walls of small diameter tubing, work formerly done by eye. But some things can fool the instruments. One mill traced a high rejection rate to workmen who held tubing in their bare hands. The warmup in the metal affected current flow and caused the instrument to declare the material no good.

Aluminum-Package Boom?

Look for more major packaging uses for aluminum to follow the recent announcement of motor oil cans made from the light metal. Aluminum drums may be next, and for other uses than present chemical containers. Despite higher initial cost, freight and other handling savings can be very attractive, especially where drums could be reconditioned for use time and again.

More Import Woes

Hopes that the introduction of new high-tensile types of steel wire would check the advance of imported wire products have dimmed. The reason: Foreign wire mills, following the U. S. lead, are now offering their own high-strength products and are still maintaining their price advantage.

Automation Needs Men

Model-changeover time in the automobile plants brings new and successful (but sometimes humorous) gimmicks to improve automated operations. One such idea led to setting up an "idle" station adjacent to each automatic assembly operation in a particular line. If the automatic unit breaks down, a human trouble shooter steps into the idle station so that production can proceed without undue delay.

Plastic Cartridge Case

Navy scientists have developed a lightweight, low cost plastic cartridge case for artillery shells. It has been tested successfully; some cases have been fired several times without reconditioning. Plastic types weigh less than half as much as traditional metal cases, cost less to produce in volume, and can save vital brass and steel for other purposes.

Congress Can't Wait

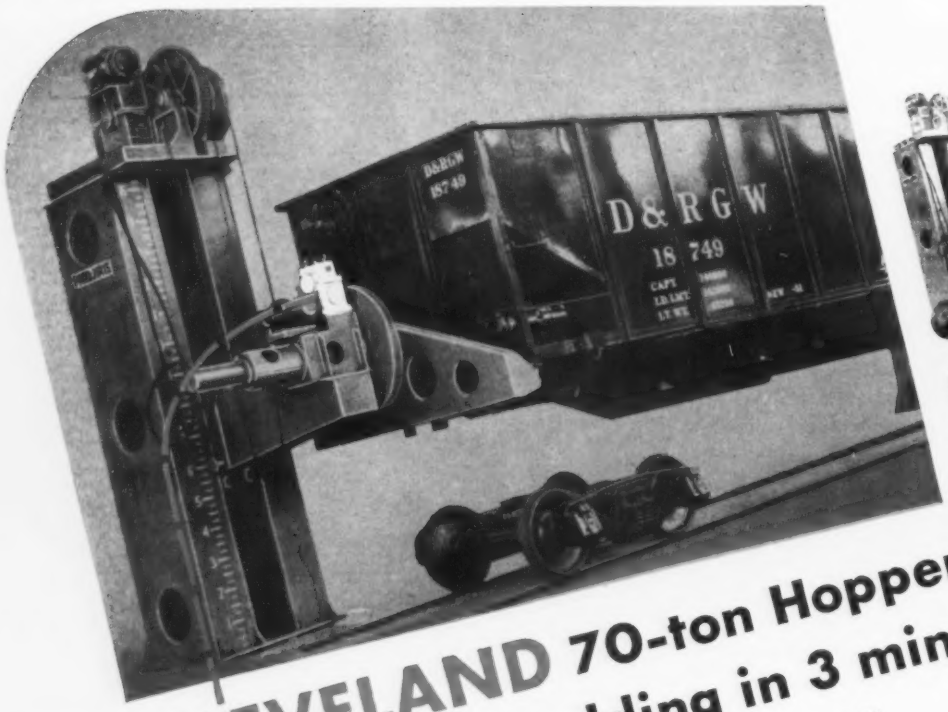
There's one clue to how hot the missile-and-rocket issue is in Washington. Watch the growing number of congressmen scrambling for places on various committees that will investigate the subject. Democrats are especially impatient for hearings to start. They'll try to show that gaps in U. S. rocket progress are "typical" of Administration ineptness.

Roll Your Own Metal?

Small rolling mills might be in line for greater usage in warehouses and other plants that handle a wide variety of mill products, but in small lots. Tipoff is a new "computer" type of mill and windup-reel drive. It works from regular ac power sources, integrates rolling speed and strip tension automatically, requires no skilled operators. One New England warehouser finds that customers appreciate his quick special-rolling service.

New Test for Anodic Films

There's a new technique for measuring the thickness of anodic films deposited on aluminum. It's both accurate and nondestructive. The method uses an interference microscope with two sources of light, white and monochromatic, that can be used interchangeably.



Above—Cleveland-powered positioner has turned a hopper car 90 degrees on its horizontal axis. It can rotate this car through 360 degrees.

With CLEVELAND 70-ton Hopper Car is positioned for welding in 3 minutes flat

SMOOTHLY and without strain, this giant positioner, designed and built by Pandjiris Weldment Co., St. Louis, lifts and turns even the largest railroad hopper car. Two men in three minutes perform an operation over which a crew of eight used to sweat for hours. A key component of this great machine is the Cleveland worm gear speed reducer.

Wherever you need a space-saving, dependable, right-angle drive, you can use a Cleveland with confidence. There are hundreds of thousands of Cleveland worm gear drives in service today, many of them still on the job after twenty, thirty, forty or more years of continuous operation.

Clevelands are made in types and sizes to meet practically every requirement. And every one is a precision-engineered, quality product, built for a lifetime of trouble-free service. Write for Bulletin 145 for complete details. The Cleveland Worm & Gear Company, 3282 E. 80th St., Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers, Limited.

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RUSSIANS: From left, four Soviet metallurgists at press conference during World Metallurgical Congress.*

Is Russia Pulling Ahead In Race for Technical Leadership?

The Answer: Not Yet, but Reds are Moving up Fast

BRITAIN'S DERRY: "I think the West is keeping pace."

Here is a down-to-earth appraisal of Free World versus Russian technology.

U. S. and European scientists note Russian advances in some fields, lack of progress in others.

The consensus: Russia's "skyscraper" approach to research is potentially a winner. We're still ahead, but the Russian threat is real.

▪ Who's ahead in the race for world technological supremacy: Russia or the Free World?

The IRON AGE editors put the question to U. S. and European scientists attending last week's World Metallurgical Congress in Chicago. Their answers boiled down to a contrast between Russia and the U. S. Here's what these scientists had to say:

1. The Russian "skyscraper" or "party line" approach to research and development is making headway. This applies both to research findings and translating those findings into production techniques. The approach is wasteful, time-consuming, but potentially a winning combination. This same concept put Sputniks I and II into their orbits.

2. The U. S. is better equipped than Russia, is ahead in production techniques and productive capacity. But we've lagged in taking advantage of new processes in such

*Left to right, Peter I. Poluhkin, rolling mills; Ivan N. Kidin, induction heat treating; Michael A. Pertsev, special steels and alloys; G. V. Rodionov, delegation secretary. Far right, John P. Nielsen, chairman, Dept. of Metallurgy, New York University.

ITALY: Says Dr. Zazzaroni, at right: "Your research facilities are so large and so well equipped."

fields as direct reduction of iron ore and basic steelmaking. While our basic research is good, we've dropped behind in application research. In this department, we've depended more and more on European developments to show us the way.

3. The basic difference between the U. S. and Russia technologically is the difference between their two forms of government. The American competitive system insists that industry stand on its own two feet: it gets few subsidies from government for research. Much research effort is duplicated. In Russia, government money is funneled into research and development with no thought of its effect on a profit-and-loss statement.

4. The U. S. will have to give serious consideration to a plan for supporting basic research, particularly in our universities. Too often promising research projects are left hanging in mid-air for lack of funds to carry them through to completion. Both government and industry are guilty of this failure to follow-through.

5. We can no longer take for granted our "superiority" in technical fields. It's time to do more "scouting" of Russian technological advances. The Russians have de-

GERMANY'S HARDERS: He was impressed by U. S. productive capacity, openhearth shops.

AUSTRIA'S KRAINER: "Russian research is impressive, though U. S. research seems excellent."

FRANCE: Jacques Pomey, right: "Your equipment is excellent . . . but you need more new ideas."

veloped an incentive system to encourage output of technical literature by their scientists. A high percentage of USSR metallurgists have learned to read English. They grab every piece of U. S. technical literature they can lay their hands on. On a recent visit to Russia, two General Electric metallurgists picked up 75 to 100 lb of Russian papers on metallurgy.

6. In spite of the special privileges and honors heaped on Russian technologists, a certain amount of dissatisfaction is creeping in. Visiting U. S. scientists noted that Russian technical people are painfully aware of their poor standard of living, shied away from inviting their visitors to their homes. The U. S. technical travelers urged that more Russian technologists be encouraged to visit the U. S., see how we live.

What Europeans Think—European metallurgists were encouraging, occasionally critical, of U. S. technology:

Dr. Helmut Krainer, Gebr. Bohler & Co., Austria: "Russian metal research is impressive, though U. S. research seems excellent. Organization of your research projects is remarkable. I think you are doing very considerable basic research."

Dr. Walther Guldner, vice director, European Coal and Steel Community: "I say this of Russia; when she develops a new steelmaking technique, it is applied immediately and in that they beat us."

Needed: New Ideas — Jacques Pomey, Usines Renault, Paris: "You have a tendency to duplicate, to jump on an idea in several laboratories at once. Your equipment is excellent and in great quantity, but you need more new ideas. Russia is behind in average quality of research, but her basic research equals that of the West."

Dr. Aldo Zazzaroni, Fiat Research and Control Laboratory: "Your research facilities are so large and so well equipped."

L. William Derry, head, Metallurgical Dept., Battersea Polytechnic, England: "I think the West is keeping pace. Russia has specialized in Sputnik, just as we specialized in atomic energy applications. But we are keeping pace."

An American Viewpoint—Dr. J. H. Hollomon, who heads up metallurgical research at General Electric, recently returned from a tour of Russian industrial plants and research laboratories. He had this to say about Russia and our interpretation of its progress:

In some respects we are our own worst enemy in that we sometimes misinterpret what Russia is trying to do. We forget that Russia has not yet "arrived" as a great industrial nation. It is striving to build up a heavy industrial economy, has some way to go before it is our equal in this respect. Most Russian "crash" programs have nothing to do with Sputnik.

LUXEMBOURG'S GULDNER: "Russia applies new techniques immediately."

Good and Bad — The Russians appear to have made more use of new developments in steelmaking: oxygen and vacuum pouring in particular. Their interest in following up direct reduction processes is slight.

In basic research the Russian record is spotty. They've done some good work in the field of martensite transformation, for example. But there are a number of instances

where their work has been rather poor.

Russian Backtracking — The Russians have a "crash" program aimed at systematically checking the effects of all the alloying elements of steel. The approach is meticulous, time-consuming, and, in some respects, wasteful. It is covering a lot of ground that has already been covered by others.

As of last January, U. S. Steel capacity exceeded 133 million ingot tons, compared with Russia's 55 to 60 million tons. But at the present rate of gain, some U. S. research men believe Russian capacity will exceed ours in the next 20 years. This is an extreme view, however, and probably is open to some question.

Iron and Steel Techniques — It is already apparent that the best Soviet blast furnace and openhearth techniques are as good as ours. There is some doubt that the same rate of progress in electric furnace practice can be claimed.

The high-pressure top, oxygen blast, and high-temperature blast are accepted blast furnace practice in the new Russian mills. So is sintered ore charging. The new openhearths are all-basic with suspended roofs and 500-ton melt capacities. They are equipped for oxygen and are usually designed for a single fuel, either gas or heavy oils depending on fuel availability.

Technical Education — Metallurgists are graduated at an estimated rate of 3000 per year as compared with 600 in the U. S. Training is for a five-year period with one to two months of in-plant training during each academic year. Metallurgical training is given top priority in the Soviet, and a Russian source estimates there are probably more research workers in steel than in any other phase of Soviet industry. Qualitatively, the Soviet metallurgist is as good as our average.

European observers report that Russia frequently tests new processes in a pilot plant rather than on a laboratory scale only. This is an area where the Russian disregard of economics puts the U. S. at a disadvantage. Few companies in this country are in a financial position to build pilot plants for working out new theories, without first getting some answers from laboratory research. In this connection, Russia has set up a continuous casting plant for no other reason than to study the process on a full-scale basis.

"Interatomic Bonding — Other phases of steel research that the Soviet is hitting hard: high pressure cells to test metals under heavy atmospheric loadings (they've built four such cells, while the U. S. has only one and it's doubtful we will need more); high-temperature alloys; railroad materials, vacuum melting, and interatomic bonding of steels.

Don't Underrate Russia—A recent metallurgical visitor to Russia summed it up this way:

"I didn't come back and hurry into my lab to test out a lot of new ideas. On the other hand, I wouldn't dare underrate Soviet research. Their high temperature steels, for instance, are every bit as good as ours.

"And remember, they read everything they can lay their hands on that comes from the U. S. We've got to start studying their literature. It's like playing football. The other team may not be red-hot, but you've always got to scout their plays. It's just common sense."

Russian Curiosity—This is borne out by the comments of one of the Russian delegates to the metallurgical congress. Said Dr. Ivan N. Kidin, professor and director, Moscow Steel Institute:

"Our steel research is at a development peak. We want to exchange information with you. . . . We'd like to see more of your steel plants."

BACK FROM RUSSIA: These three Americans visited Russian plants and laboratories. Left to right, David Swan, of Linde; Dr. John Hollomon, and Dr. Walter Hibbard, both of General Electric Research Laboratories.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

AIRBORNE: Modification of heavy equipment for easy air transport is goal of Army Corps of Engineers.

How to Airlift Heavy Equipment

Army contractor probes problem of flying bulky and heavy Corps of Engineers' machinery.

Study of 82 pieces reveals some design changes are desirable in almost every one.

■ Efficiency and superior operations just aren't enough any more, particularly in military equipment. The Army is beginning to think of easy air transportability as an added procurement yardstick. Chances are the Pentagon will eventually alter specifications in this direction.

The military traces its difficulties in air transport of heavy equipment back to the days of the Berlin Airlift, where disassembly and assembly of machinery was a major headache.

Study Is Begun—The problem was attacked, in 1954, by hiring Albert E. Blomquist and Associates, New York transportation engineers. The firm studied a total of 82 pieces of gear, including road-building equipment, compressors, cranes, field machine shops, welding equipment, and all types of vehicles. The aircraft which will probably be available to do the moving were also considered.

Disassembly techniques, hinging on capacity of the aircraft, were worked out. Where disassembly was impractical or impossible, the equipment was modified.

Some Easy Answers—Mr. Blomquist and his staff also worked out many different load combinations for the various aircraft. Complete loading and unloading techniques, documented by over 1500 photographs, will be compiled into army field manuals.

Some of the modifications recommended would not require extensive re-engineering. They include: Permanently marking each piece of equipment and all its major parts at the center of gravity and weight, adoption of some form of color coding; standardization of fasteners; wider use of lift rings.

Losses Minimized—Standardization of fasteners would be of great assistance, says Monte Caliman, field engineer on the project. He reports that the 82 pieces of machinery contain over 200 different sizes and shapes of washers. A few standard sizes would eliminate the difficulties which could arise if a special size nut and bolt were lost in transit.

More extensive modifications are usually necessary when a piece is either too heavy or too big to be moved as is. In some cases, the solution is simple. King-size wheels, for instance, are temporarily replaced by smaller ones.

Calls for Ingenuity — But the most common difficulty is finding a way to divide a piece into parts when such was not intended by its maker. The usual solution is to eliminate weldments in favor of bolts. Other cases require more ingenuity, as in the instance of a large shovel crane whose cab had to be cut and hanged at the glass line.

MOONWATCHERS: The Sputnik launched a new era for the U. S. economy. How will it affect your business?

Sputnik Era's Impact on Business

By Eliot Janeway—

Economist Eliot Janeway is no man to mince words. He has strong opinions, states them forcefully, and lets the chips fall.

In this article, Mr. Janeway sets forth his opinions and convictions on the impact of the Sputnik Era on the economy.

▪ No question about it, Russia has aced us again. Even President Eisenhower is beginning to admit it. And no doubt the Russians still have many other tricks up their sleeves, as Mr. Khrushchev has announced.

Meanwhile, however, all America is speculating about the scientific, military, and political significance of the new defense emergency Russia has created. But very few Americans have yet begun to assess the tremendous impact of the Sputnik Era on U. S. business conditions.

Remember Korea—By this time, it has become apparent that the Administration has been caught napping and will now be forced to spend much more money in order to put us back into the missile race with Russia. This is not the first time the Russians have presented us with a large scale defense crisis. Remember 1950—when we had economized on conventional armament and had publicly announced our intention of pulling out of Korea. Shortly, thereafter, the Korean hostilities began.

The outbreak of the Korean War forced the government overnight to step up its defense spending in a dramatic way—from a level more than 50 pct below the present defense budget. The economic impact of the Korean speed-up in defense spending was considerably more obvious than that of the coming speed-up in the missile program will prove to be—first, because there was, of course, "a war on" (with the prospect of more or less immediate Government controls) and, secondly, because U. S. quartermasters—and, therefore, U. S. purchasing agents as well—immediately began buying everything in sight.

Less Dramatic—Now, however, the coming increases in defense spending will not hit the commodity markets in any such dramatic fashion. At best, U. S. missile production is a 1959 proposition. The coming speed-up in the missile program must, of necessity begin, first, as a speed-up in research and development, then in construction, and finally in actual production and materials buying.

In 1950, the defense emergency made its impact felt directly and immediately throughout the economy by giving a lift to the relatively depressed level of all materials markets —even those most remote from the needs of the armed services. The impact of the 1957 defense emergency will be just as significant for the economy as a whole, though much less dramatic at the outset, market by market.

Demand for Skills—For today's defense crisis will first hit what is now the tightest market of all (in spite of the present business panic) —the labor market, which since the New Deal has not been thought of

as a "commodity" market in the usual sense of the word.

Step-ups in research and development, especially on missile account, mean step-ups in labor costs—and premium labor costs at that. Research and development work not only involves a much higher ratio of direct labor to production; it also involves a much higher ratio of highly skilled, salaried labor to hourly, production labor. Remember, in this connection, that it was Secretary Wilson's "economy" directive forbidding defense overtime last spring which signaled the beginning of the current "depression" scare.

Overtime Returns—Now the reinstatement of overtime in research and development work—if not, unfortunately, in actual production—is about to signal the beginning of a new and badly needed shot in the arm for the U. S. economy.

Meanwhile, the greatest nontechnological obstacle in the way of U. S. defense progress has been our stubborn refusal to coordinate our defense policies with our monetary policies. Political isolationism has been for many years a "dirty word."

Economic Isolationism—But the Federal Reserve Board, whether it knows it or not, has for some time been practicing economic isolationism: witness its formulation of monetary policy on a purely domestic basis (and 90 days late, even then!). During recent years since President Truman appointed Mr. Martin Chairman of the Federal Reserve Board, U. S. defense policy has at any given time been subject to current U. S. monetary policy.

In other words, the level of U. S. investment—on both defense and commercial account—has been permitted to rise only in conjunction with a more or less corresponding rise in the level of U. S. savings.

Policy a Gamble?—Thus, the FRB's policy has amounted to a gamble that Russia would not precipitate a new and continuous emergency—as in fact she has done and which in fact we must now finance. The Federal Reserve Board has been willing to count only the total number of dollars invested; it has counted dollars invested for missiles on the same basis as dollars invested for bowling alleys. The Russians have now rendered this approach obsolete.

The theme of Chairman Martin's August testimony before the Senate Finance Committee was that all of us—including the Government—are spending too much. "If," he said, "the gap between investment demands and available savings should be filled by creating additional bank money, the spiral of inflation . . . would be given further impetus. If the Federal Reserve System were a party to that process, it would betray its trust."

Security First—The most important trust vested in the U. S. Government—and, therefore, in the Federal Reserve Board—is the protection of the national security. The newest Russian threat to that security is now forcing the entire government, even including the FRB, to change its tune.

From now on, if we mean to achieve a military stalemate with the Russians—and, like it or not, this is the best we can hope to achieve this side of 1960—the rate of U. S. investment can no longer depend on the rate of U. S. savings. It must instead be governed by the much more fundamental and realistic terms of the arms competition with Russia.

This, in turn, means that the FRB will no longer be permitted to impose its obstinate policy of orthodox European monetary restraint on the American standard of living in order to increase the savings of the public by the dubious method of trying to decrease the income of the public. The most significant influence of the Sputnik Era on the U. S. business trend will be to free the rate of U. S. defense investment from crippling (and costly) dependence upon arbitrary monetary controls based on the rate of public savings.

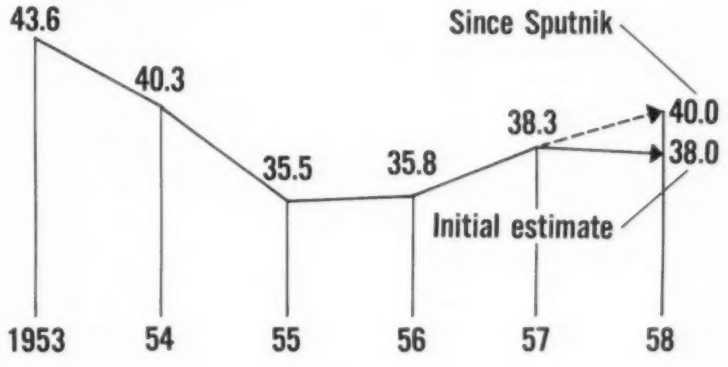
Two Years Grace — Meanwhile, the U. S. still has some two years of grace in which to try to neutralize the advantage which the Russians have now seized. Fortunately for us, this advantage is not an across the boards advantage—it is still a particularized one. For the moment, the U. S. is capable of mounting a powerful striking force against any large scale Russian aggression—thanks to our "conventional" airpower and our forward bases overseas.

Higher U. S. Spending—Clearly, maintaining this advantage will mean more Government spending—for relatively conventional weapons and for foreign aid. It also means

And Now Where?

Expenditures for Dept. of Defense

Billions of Dollars



that the recession the FRB is trying to induce would cost us more than we can afford to pay. For any severe and sustained slump in U. S. activity would quickly make itself felt in allied countries across both oceans.

Education Needed—In addition to maintaining our present striking power, the pressure is on us to invest the two precious years remaining to us in trying to catch up with the Russians in the weapons of the future. Our defense program is at present confronted with a problem far more serious than either technological difficulties or financial ones—the problem of providing technically skilled personnel.

The Pentagon admits, for example, that it would take us as much as ten years—if we initiate a "crash" educational program along with our crash missile program—to catch up with the Russians on this increasingly crucial educational front.

Economic Lift — Government money spent on classrooms and teachers' salaries won't send purchasing agents scrambling for inventory, as the Korean crash program did. But it would pump a great deal more money into the U. S. spending stream, just as overtime for scientists and technicians is about to do right now.

The U. S. can and must afford the defense program needed to catch up with present Russian advances as well as to catch up with the further progress Russia will have made two years from now. This is the most important problem now facing U. S. business and the country as a whole. Question at the moment is no longer whether business will be good or bad; it is, rather, whether or not we will spend the money needed to stay in the missile race with Russia.

If we don't, the business outlook should be the least of our worries. But if we do, as indeed we must, the business outlook will for this very reason turn out to be the least of our worries—because business will be as good as our relationship with Russia is bad. This means that business will be very good indeed.

TROUBLE: Will crystals (magnified 9000 times) cause metal failure?

Crystals Key in New Corrosion Theory

▪ A unique crystal growth, so fine as to escape detection except by very strong magnification equipment, may be metalworking's strongest adversary in the battle against stress corrosion cracking.

Dr. Earl A. Gulbransen, advisory chemist at Westinghouse Research Laboratories, Pittsburgh, presented this new theory to the Second World Metallurgical Congress at Chicago.

Fails Under Stress—This type of failure can occur in metal structures which are chemically corroded while under internal or applied stress, explained the Westinghouse chemist. Stress corrosion cracking can be triggered by such mildly corrosive substances as steam or human perspiration; and occurs in objects subjected to stresses as slight as the internal stresses left in them during their manufacture.

Items susceptible run the gamut from turbine blades to coffee urns.

His experiments were made with stainless steel. When a wire or disk was heated in an atmosphere of pure oxygen and water vapor, the only reaction was the growth of oxide "whiskers." But electron microscope probing revealed that when a trace of chloride ions were introduced, rows of thin, upright, parallel plates began growing along a definite crystallographic direction. Each cyrstal is a half-millionth inch thick, 120 millionths of an inch high.

Assisting in the experiments were Westinghouse research engineers T. P. Copan and Dr. Daniel van Rooyen.

Cuts Canyons — Dr. Gulbransen theorizes that these crystals cut tiny canyons into the metal's surface, concentrating stresses at the base of the crevice, causing eventual failure. He believes his studies will result in a better understanding of the corrosion mechanism.

Why Southern Mills Are Hurting

Imports, Northern Competition Add to Sales Woes

Steelmen below the Mason-Dixon line are acting to revitalize their sagging market.

A wider product mix is one possible answer to the problem. —By G. J. McManus.

■ Southern steelmakers are troubled but not panicky.

They have seen orders drop sharply since July. They are going through the difficult process of work force reduction and reassignment at a time when strong emotional forces sweep the area.

They share in the industry-wide problem of finding work for new facilities at a time when sales are slack.

The Question—Why are southern mills operating at a rate in the high 60's, even lower than most of the rest of the country, when the area normally has a deficit of two to three million tons of steel a year? In 1954, for example, they operated at nearly 75 pct of capacity while Pittsburgh, Cleveland and Eastern mills were under 70 pct.

The current situation is different. Southern mills felt the drop in the market later, but more abruptly, than the northern lag. Orders held up well through April, May, June, and July.

The Answer—But northern mills began feeling a letup in demand in the spring. They started to look for customers far from home. They began stepping up shipments and sales activity in the South.

The extra tonnage provided in this manner quickly soaked up any excess demand in the South. There was no cushion when reduced industrial activity and inventory cutbacks brought order slashes at the end of July. Customers stopped placing new orders, then began cancelling old ones. The operating rate dropped from 87.5 in August and has now touched below 70.

Inventories Pile Up — While northern competition has speeded the slide, the biggest single factor in the southern steel lag has been inventory. Over 200,00 tons of oil country casing and tubing are laid up across the river from New Orleans. When improved mill deliveries made this kind of standby tonnage unnecessary, there was a general move to plug up the supply lines.

On top of this, there has been a slowdown of two key southern industries, construction and oil production. Oil well drilling was off sharply in the first half of the year. It has picked up since, but the year as a whole will fall short of 1956.

Imports Hurt — Probably the most irritating problem to southern steel mills is imported steel, which apparently is making much stronger inroads in the South than in other areas of the country.

Over 700,000 tons of foreign steel products came into southern ports in 1956, or about half of the U. S. total. This was 65 pct more than 1955. This year is expected to show another 19 pct gain.

Florida Is Swamped—Merchant wire products and reinforcing bars have been the big import items. At one time last year, the whole Florida market for reinforcing bars was taken over by importers. Domestic producers say they are now making some headway in Florida, but they are bucking heavy stocks of low-priced imports.

A considerable amount of foreign pipe was bought by oil producers last year, but this trade has fallen off with the improvement of domestic supply. Merchant wire products are the toughest nut.

Undercutting Spreads — The introduction of high-tensile barbed wire and other efforts by domestic

How Imports Hurt Southern Steelmakers

Over 700,000 tons of steel cleared through Southern ports last year. That was 50 pct of the total U. S. imports. It was 65 pct more than the South received in 1955; 72 pct more than in 1954. In the first five months of this year, Southern steel imports were running 19 pct over 1956.

Biggest 1957 Increases

Nails	Up 55 pct
Reinforcing Bars	Up 17 pct
Barbed Wire	Up 7 pct

Biggest Receiving Areas

(Pct of Southern Steel Imports)

Galveston	47 pct
Florida	29 pct
New Orleans	12 pct
Mobile	5 pct
South Carolina	3 pct
Georgia	2 pct
North Carolina	2 pct

mills have done little to check importers. They continue to maintain an edge of about 75¢ a coil.

Now, foreign mills are broadening their nail lines to include the specialty types that were left to American producers.

Another problem for southern mills is product mix. The South makes sheets, bars, and wire, primarily. These are the products that are weakest everywhere.

Good Structurals Demand — "I could sell all the heavy plates and wide flange beams I could get," says one district executive. Unfortunately, southern mills are light on these products.

The falloff in building hurts too. Construction is down 1 pct from the first half of 1956. Two big elements in this lag are home building, off 6 pct, and public building, down 4 pct. On the bright side, industrial construction is up 11 pct. Moreover, the public building slump is more of a financial postponement than a permanent cutback.

Bottlenecks — Over 150 major jobs have been contracted for, but are being held up because municipalities can't sell bond issues. Roadbuilding programs are in a somewhat similar fix, but here the holdup seems to be mostly red tape.

Spot ailments in the Southland include the falloff in railroad buying; 11 pct of U. S. Steel's Tennessee Coal & Iron Div. is in rails. Only 20 pct of the normal cotton crop has been baled, due to bad weather. Atlantic Steel and T. C. & I. are big producers of bale ties.

More Variety — However, the South is making important strides toward wider product ranges, more efficient production, and toward a supply of the steels needed for mass production industry. Republic Steel (see page 124), is now operating new electric furnaces and a new cold-rolling mill at Gadsden.

Atlantic Steel recently built a continuous bar mill at Atlanta. Connors Steel Div. of H. K. Porter is now selling cold-finished bars.

Tool and Diemakers Watch Detroit

News of programs for 1959 models indicates big orders may be coming from automakers.

This year's dollar totals are up, but in terms of net return '57 shows declines ranging from 15-25 pct.

▪ What's the tool and die outlook?

After a tough fall, it begins to appear that winter winds will blow up some new business. Automotive tool and die suppliers now expect to get their first sizable orders for tool and die work for the 1959 models in mid-November.

Better Than '58—First reports sound good. Eastern diemakers will get up to one-third more tooling orders than they did for the 1958 model, if early reports are correct. With one of the major firms talking this kind of production, it is a safe assumption that others are gearing for a similar advance.

It means that the 4000-shop contract tool and tie industry will probably crack through the $1 billion barrier for the second year. Part of the dollar gain is accounted for by increased tooling prices. Pinched by advancing labor costs, tool and diemakers began edging up their prices early this year.

Can't Hold Line — Despite the sharp price trimming that was prevalent in September-October, it's still a safe bet that current tool and die output is running 10 pct above a year ago.

And despite general comment that prices should hold steady in the months immediately ahead, and probably into second quarter of 1958, a substantial number of die men report they can't and won't hold the line. Any gain in general tool and die business, they believe, whether it's entirely automotive, or as a result of gains in other markets that are temporarily dead, will see a continuing and very gradual upward price adjustment.

The Outlook: Here's how die manufacturers attending the National Tool and Die Makers' Association meeting feel about the outlook:

DeWitt Bills, World Tool & Engineering Company, Minneapolis: Business conditions in that area seem only fair, with work weeks running 40 hours or less. There's been a mild pickup reported recently, though part of this seems the result of production of special machines by the die shops, rather than any strong gain in die work.

Daniel Karpinsky, Westlof Tool & Die Company, Detroit: Detroit work is spotty with die-buyers tending to rely on firms with which they've a long buying record.

Missile Orders—Alex Skulsky, Falco Machine and Tool Company, California: There's been an improvement in recent weeks, particularly in die orders from missile manufacturers. One area shop reports more inquiries in the past two weeks than had been received in the previous two months. Civilian aircraft building for the airlines has boomed business outside Los Angeles county, with the result that 70 pct of the shops in that area are broadening their market. Work week has advanced to 55 hours and the six-month outlook is strong.

Though dollar totals for tool and die are high this year, it's been an uphill fight. In terms of actual net return, estimates of business declines thus far this year range from 15-25 pct, with the average tending toward the higher figure.

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Price Probe: Autos Are Next

Sen. Kefauver's probe of so-called "administered" price industries will focus on the automakers next month.

The senator has "invited" four witnesses from Detroit to appear before his subcommittee on Dec. 16.

Then Sen. Kefauver says he hopes the hearing will develop "a better understanding of the problems involved in a formula for holding the wage and price line in the automobile business."

He also will claim the present wage spiral is due largely to price increases in administered price industries, and will ask why auto price rises are more than the $2 to $8 per car attributable to the recent steel price increases.

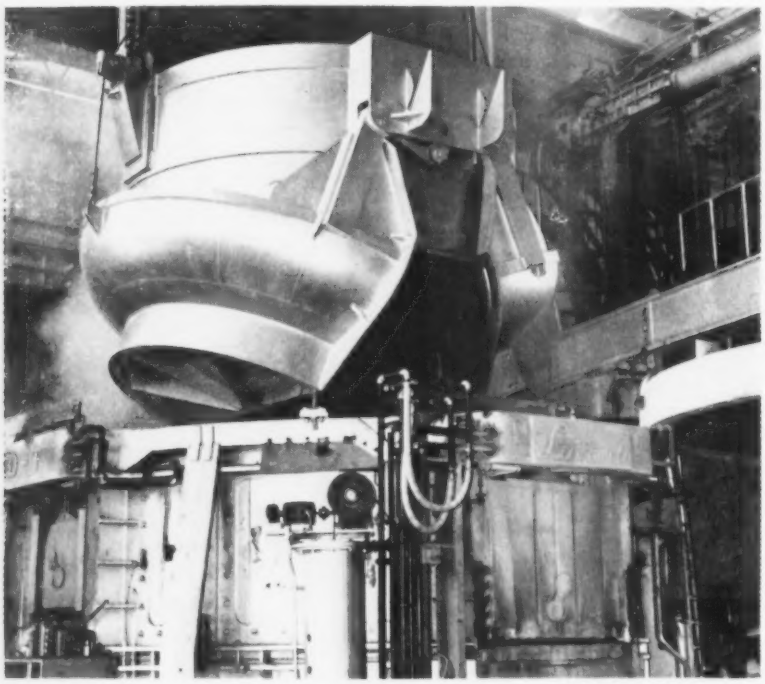
Top Men on the Stand—The "invited" guests will be the presidents of General Motors, Ford, and Chrysler as well as AFL-CIO United Auto Workers boss Walter Reuther. The Reuther offer to ease wage demands in exchange for a cut in car prices will be given a thorough going-over.

Sen. Kefauver wound up his investigation of the steel industry with a two-day verbal fencing match with George Humphrey, chairman of National Steel Co., formerly Treasury Secretary.

Mr. Humphrey, an old hand at parrying leading questions, repeatedly refused to be feinted into discussion of other steel firms or Administration economic policies.

And Then—After the auto industry, the subcommittee indicates it may take a look at pricing policies in other industries, including tin can, roofing, farm machinery, aluminum and paper producers.

More Steel From the South



• A major expansion just completed at Republic Steel's Gadsden, Ala., plant provided:

1). Two electric furnaces rated at 175 tons per heat, said to be the largest ever installed in the South.

2). A strip mill to turn out 30,000 tons per month of hot-rolled, cold-rolled, and galvanized sheet and strip.

50 Pct More Capacity—New ingot capacity of the Gadsden plant is 1,197,000 tons, compared to the 789,000 tons previously turned out by eight openhearths. The new units feature swing-away roofs so that scrap can be charged from a huge bucket on an overhead crane. (See photo.)

The new mill equipment, which can produce coils or cut lengths to 48 inches wide, is expected to "act as a magnet attracting new fabricating plants into the area."

Revive Terne Line—At Warren, O., Republic is reviving its production of terne plate and building a continuous terne metal line. Initial plans call for a monthly output of 1000 tons of coils or cut lengths.

Armco Seeks Subsidiary

Armco Steel Corp., Middletown, O., will acquire the business and assets of Union Wire Rope Corp., Kansas City, Mo.

The boards of directors of both companies have approved the proposed move, to be approved by the stockholders before it can take effect.

Under the current plan, one share of Armco stock would be issued for every 2½ shares of Union.

A subsidiary company would be formed using the same name and personnel of the acquired wire rope maker.

Climax, American Plan Merger

Directors of the American Metal Co., Ltd., a major metals importer and custom smelter; and Climax Molybdenum Co., major factor in the domestic molybdenum industry, have agreed to a merger of companies.

If stockholders of both firms approve, American Metal Climax, Inc. will be formed.

Three shares of the new company's stock will be issued for each share of Climax Molybdenum, with the exception of the 225,000 shares held by American Metal.

Columbia Tool Steels for 1957-58
with A.I.S.I. Identification and Type Classification of Tool Steels

GRADE	Identifying Elements, in Per Cent										
	Type	C	Mn	Si	Cr	Ni	V	W	Mo	Co	Cb
COLD WORK TOOL STEELS — OIL HARDENING — TYPE SYMBOL O											
EXLDIE GM-02DIE	O1	.90	1.00	—	.50	—	—	.50	—	—	—
	O2	.90	1.60	—	—	—	—	—	—	—	—
	O7	1.20	—	—	.75	—	—	1.75	—	—	—
MEDIUM ALLOY AIR HARDENING — TYPE SYMBOL A											
E-Z-DIE SMOOTHCUT †	A2	1.00	—	—	5.00	—	—	—	1.00	—	—
	A4	1.00	2.00	—	1.00	—	—	—	1.00	—	—
	A5	1.00	3.00	—	1.00	—	—	—	1.00	—	—
	A6	.70	2.00	—	1.00	—	—	—	1.00	—	—
HIGH CARBON-HIGH CHROMIUM — TYPE SYMBOL D											
	D1	1.00	—	—	12.00	—	—	—	1.00	—	—
ATMODIE	D2	1.50	—	—	12.00	—	*	—	1.00	—	—
ATMODIE SMOOTHCUT	D2	1.50	—	—	12.00	—	*	—	1.00	—	—
SUPERDIE	D3	2.25	—	—	12.00	—	—	—	—	—	—
	D4	2.25	—	—	12.00	—	—	—	1.00	—	—
	D5	1.50	—	—	12.00	—	—	—	1.00	3.00	—
	D6	2.25	—	1.00	12.00	—	—	1.00	—	—	—
	D7	2.35	—	—	12.00	—	4.00	—	1.00	—	—

†With smooth cutting free machining additives

*Atmodie and Atmodie Smoothcut contain approx V.90%

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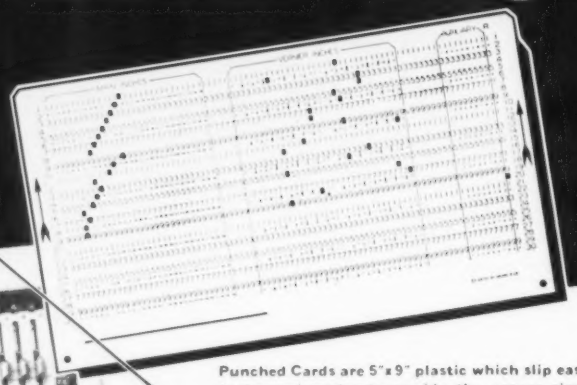
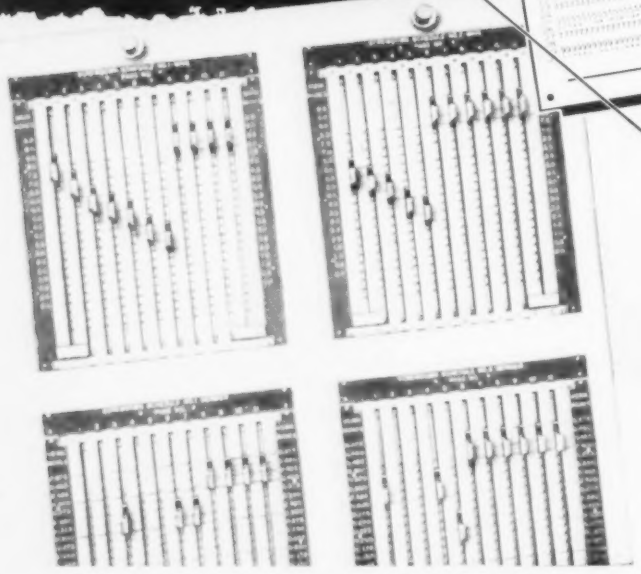


Punched Cards are 5"x9" plastic which slip easily into the card-reader to provide the proper signal for each pass. Indexing is automatic for the complete schedule.



Complete schedules are easy to set-up on EC&M Slider Contact Panels.

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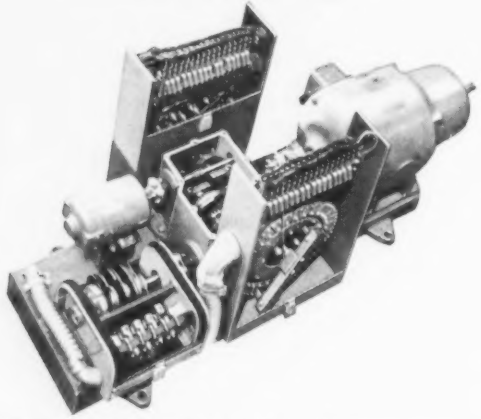
The EC&M Automatic-Positioning Screwdown Control permits a mill to be operated at full capacity. This system of control has been operating successfully for 20 years, giving a high rate of production with products rolled to close tolerances. Nearly 50 installations use this EC&M Automatic Control.



EC&M Roll-Position Sensing Unit is simple and compact—controls roll movements from pulpit or control room—up to 1,600 settings per pass permits small increment roll-settings.

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But it wasn't until a dozen years ago he found his medium —magnesium.

He is the industry's unanimous choice for its leader in 1957-1958.

▪ Helping lead the way for the magnesium industry—which claims the world's lightest structural metal —is an engineering heavy-weight named P. B. (Phil) Craighead.

As president of the Magnesium Assn. and of his own company, Magnesium Products of Milwaukee, he is a combination promoter, prophet, designer, and salesman. He heads a company whose strength lies in development and prototype contracts rather than in a product line.

P. B. CRAIGHEAD: Backbone of a new industry is product development.

Small Start — Growing demand for products having "flying weight portability" is music to his ears. He has been plugging away for magnesium use in this area for years.

Phil Craighead began realizing the potential of "mag" during World War II, while he was chief of structures for Bell Aircraft Co. In 1945, he cast his lot with magnesium and organized MPM. He built his fledgling firm from a three-man company with 2000 sq ft of basement space to a 55-man organization occupying more than 25,000 ft of choice manufacturing area.

Creative Spirit—MPM's growth, while not phenomenal, is attributed almost entirely to Phil Craighead's urge for creative design—an urge which he says has been keeping him going since his graduation from Massachusetts Institute of Technology in 1918.

One of his company's mainstays is a geodesic dome used as a shelter for men and machines (see photo). It was invented by R. B. Fuller, who teamed up with Mr. Craighead and turned the idea into what they call "the first major basic improvement in mobile military shelters in 2600 years."

Today, dome shelters varying in diameter from 20 to 57 ft are being built by MPM for the U. S. Marines.

Finds Many Markets — One of the most challenging projects to which Phil Craighead has directed his efforts is a telescoping portable communications tower, reaching 150 ft upward yet erected from a platform which is built into the self-contained 12 ft package. Current production of the unit is primarily for the Australian government.

Mr. Craighead has introduced many other lightweight magnesium products including components for electronic equipment, material handling and maintenance equipment, sifters for grain and chemicals, micrometers, gages, portable aircraft maintenance shelters and hangars.

By faith and persistence, Phil Craighead succeeded in building an industry where there was none before. His skill in transforming an idea into a product continues to win converts for magnesium.

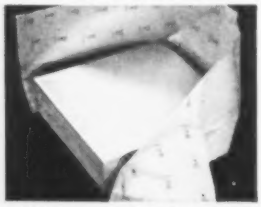
how to rustproof cold rolled steel in shipment and storage

Proved by actual test! Unwrapped steel rusted within a few hours. Identical steel wrapped in Ferro-Pak showed no signs of rust . . . even after several months. Non-toxic chemical vapors from Ferro-Pak coat the steel with an invisible film that makes it impossible for rust to get the slightest foothold.

Even under adverse conditions, such as outside storing or shipping, Ferro-Pak provides complete protection. It is waterproof, strong, yet highly flexible and easy to handle. The chemical rust inhibitor is compatible with oil and stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write Cromwell Paper Company, 4803 South Whipple Street, Chicago 32, Illinois.

How to rustproof a freight car—Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.



How to rustproof black plate—On this light gauge, dry, uncoated steel, rust can start from a fingerprint. Ferro-Pak keeps black plate rust-free even when the humidity soars!

FERRO-PAK®
by Cromwell

For over 38 years—
"Paper Engineers" for Steel

Keep an Eye on Labor Trends

Lost in all the Congressional hearings is the fact that this year is one of the quietest in terms of strikes.

In another area, labor is stepping up plans to discourage relocation of plants.

▪ If you reflect on labor developments so far in 1957, it sounds like one of the most tumultuous periods in labor history.

The congressional hearings involving Dave Beck, Jimmy Hoffa, the Shefferмans and the host of lesser lights dominate recent developments in labor.

Next in line probably are the pronouncements of ever talkative Walter Reuther on the short work week, demands for a price cut on automobiles, and others. All in all, it's been a very eventful year, laborwise, and it's not over yet.

Otherwise, Peaceful — All the noise and shouting tend to obscure the fact that in terms of strikes and work stoppages, it's been one of the most peaceful since organized labor gained its "big labor" status.

In terms of workers idle and man-days of idleness because of strikes, the first nine months of 1957 had the lowest strike activity of any post-war period. The number of work stoppages was smaller than in any year of that period with the exception of 1954.

Long Term Contracts — A big factor, of course, is the growth in scope of the long-term contract. With most of the giants of labor operating on multiple-year contracts, the opportunity for strikes of wide scope has decreased. And most of these contracts were not up for renewal this year.

But even at best, the totals for stoppages and man hours lost are depressingly high. In the first nine months of this year, there were 3125 stoppages involving 1,314,000 workers, 13,340,000 man-hours.

Improvement Significant—But in terms of all working time lost, the improvement is encouraging. In the first three quarters of this year, time lost in strikes amounted to .16 pct of working time. This compares with .36 pct in 1956 and a 1947-49 average of .44 pct.

Highest in the post-war period was 1952, with .68 pct.

Unions Buck Plant Moves

Stop That Move—Labor is getting more serious in efforts to prevent industry from plant movement, where it means moving a plant or manufacturing facility away from its established labor force.

This isn't exactly a new development. But particularly in the recent expansion and improvement boom that has characterized the past two years, more new and efficient plants have been constructed. This frequently involves a move to a distant area.

Protect Workers—The AFL-CIO is now stepping up its activity to "protect" workers in plant re-locations. It is urging unions to write "minimum protection agreements" into labor contracts.

It should be pointed out that several proposals urge cooperation to maintain plant efficiency and forestall a move.

Bargaining Proposals—These are the bargaining proposals, as condensed from the Collective Bargaining Report of the AFL-CIO:

1. Encourage management to maintain work at the existing plant. This includes special cooperation to improve the plant and development of union standards at other locations to minimize disadvantages of present plant.

2. Provide for re-location of workers to where the plant is going or to other jobs in the company. This should include, the union says, right to transfer, provision for re-training, and payment of expenses.

3. Provide a "financial cushion" to those who will not or can not move. This means severance payment.

The Equalizer — In line with plant movement, the economic advantages of lower labor costs in some areas of the country are rapidly disappearing.

A recent Labor Dept. study confirms that wage increases have been significantly larger since 1953 in areas that were once called low cost.

South Moves Up—For example, on an index of 1953 = 100, unskilled labor has gained roughly 21 points in Atlanta since 1955 compared with 11 points in Buffalo.

THEN AND NOW: Compare chain-driven 1915 GMC truck, left, with 1958 version and see how styling has changed. Improvements planned on future trucks will be as great as between old and new models shown.

Coming Changes in Truck Design

Radical departures from today's truck engineering are foreseen by leading producers.

Simplification, economy, and glamor are guideposts for stylists.—By H. R. Neal.

■ Trucks, unglamorous workhorse cousins of the automobile, often go unnoticed at this time of the year. They are lost in the splash and glitter accompanying the auto industry's annual debut of the favored offspring—the passenger car. But the truck makers have been talking too—not just in terms of 1958 models, but of future trends as well.

One hint of what's ahead in highway haulers comes from the GMC Truck & Coach Div. Philip J. Monaghan, General Motors vice president and general manager of the division, said GMC "has embarked on a far reaching engineering development program for GMC trucks that will bring 'super-trucks' onto the super highways of the future."

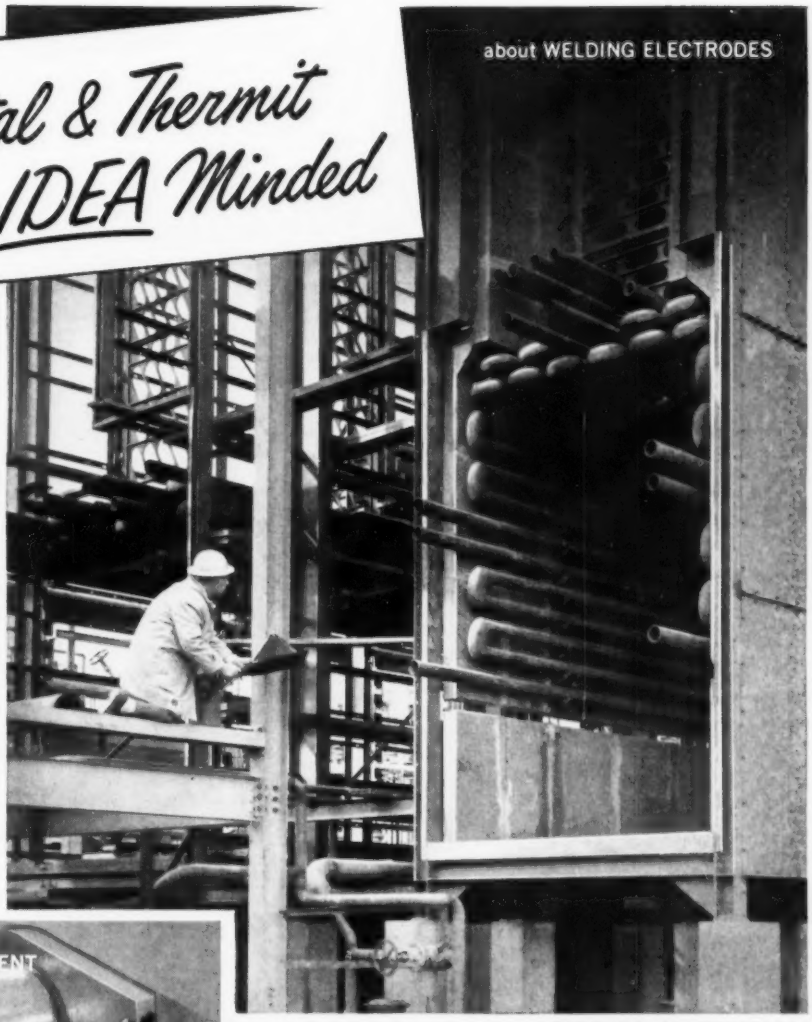
Design Came Second—Mr. Monaghan called present truck design a "piecemeal" process. New engineering developments—automatic transmissions, air suspension, power steering, etc.—have forced manufacturers to adapt truck design to accommodate the advancement. "Each succeeding change—as good as it is—has made the pattern somewhat less than a planned blending of all the parts and pieces," he said.

In the face of this self-criticism, Mr. Monaghan advanced a solution. What is needed is "a complete and radical departure from traditional truck design as we know it today," he said. To achieve this end the GMC truck engineering department has been expanded 22 pct in the past year and is now one of the largest in General Motors. And it "is tieing together new truck engineering concepts of greater economic significance."

Coming—A clue to what might eventually emerge can be gleaned from the needs of the truck operators. The truck buyer in the future, Mr. Monaghan said, wants engineers to design a truck that has:

1. Less weight and greater strength.
2. More cubic cargo space under the same length, width and height restrictions.
3. New engines with high performance, longer life and more economy, yet more compact so they fit into shorter cabs.
4. Foolproof, wearproof brakes for greater safety.
5. New types of power transmissions to get away from the mechanically complicated auxiliary gear boxes and multispeed axles.
6. Plenty of power for the truck at the right moment, without a lot of gear shifting.
7. More comfort for the driver, more built-in safety features, new suspension systems, new steering

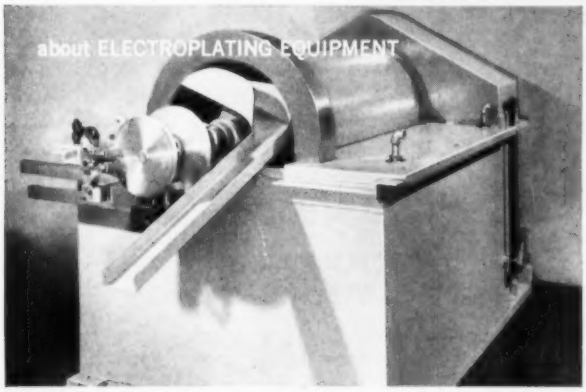
from: Metal & Thermit
to: The IDEA Minded



Welding problem solved— production increased

The Blaw-Knox Company, a leading designer and constructor of high pressure, high temperature catalytic reformers for petroleum refining uses special chrome-moly pipe to resist hydrogen attack on furnace tubes at high temperature and to provide desirable creep properties. Welding this alloy had always been difficult. Yet maximum assurance against weld-failure was essential.

Chosen for this difficult job, M&T's Murex® CROLOY electrodes make it easier to obtain high quality welds because maintenance of preheat and postheat temperatures is not critical. These Metal & Thermit electrodes, combined with Blaw-Knox designed unique welding back up equipment, increased productivity of the Blaw-Knox welding crew by a full 50%. They improved weld penetration, eliminated underbead cracking.



A barrel of savings in small parts plating

Chromium plating of small parts is no longer a costly, manhour consuming operation. The unit shown is the new *continuous* Unichrome chromium plating barrel designed by Metal & Thermit. This is a real production tool. It equals 4 batch type barrels in output; plates up to 200 pounds of parts per hour. It brings automation to companies that must chromium plate hundreds of thousands of small parts per day.

Bronze finish wins the trophies

Arlen Trophy Company, leading manufacturer of die cast trophies, finds "gold" in the M&T Bronze Plating Process. Cups formerly plated with copper, nickel and gold now get a beautiful-to-behold bronze finish directly on castings. It is the image of 24 kt. gold!

M&T Bronze is also being used in hundreds of installations to replace copper as an undercoat, plating intricate parts more uniformly and twice as fast. It also helps conserve costly nickel.

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ORGANIC COATINGS
TIN & TIN CHEMICALS
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WELDING SUPPLIES
METALS & ALLOYS
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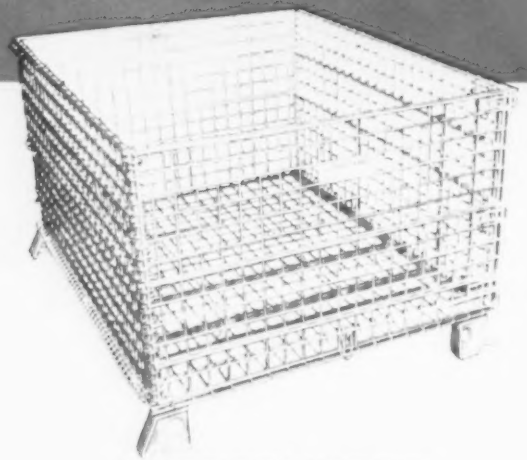
TRI-STATE ENGINEERING COMPANY

CARGOTAINERS®

PALLETS . . .
CONVEYOR GUARD
and other Materials Handling Equipment

Tri-State materials handling equipment is constructed of heavy gauge steel wire—strong enough to stand up year after year in the hardest service, yet extremely light in weight. Corrosion-resistant, pre-heated vinyl aluminum paint adds long service life. This equipment simplifies the problems of materials handling in a wide variety of applications and produces substantial savings in materials handling costs.

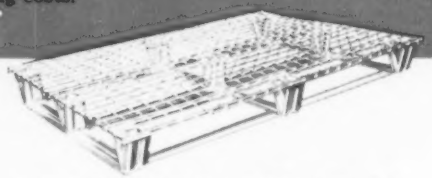


CARGOTAINERS

Cargotainer is Tri-State Engineering Company's registered trade name for the line of containers which the Company has manufactured since 1946. Thousands are now in use throughout industry, providing compact and convenient handling and storage of all types of products, parts, etc. They speed up loading and unloading of materials in shipping.

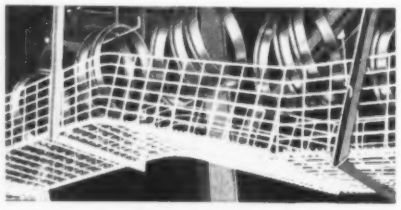
Cargotainers are available in three capacities (1, 2 and 3 ton); in two types of bases (which stack interchangeably); and with a wide variety of optional features such as full or partial drop ends or sides, crane eyes, vertical and horizontal dividers, etc.

All types are collapsible, for space-saving storage and shipping when not in use. Standard sizes: 32" x 40" x 24"; 32" x 40" x 28" (3,000 lb. cap.); 36" x 46" x 24"; 40" x 48" x 24"; and 48" x 48" x 24".



TRI-STATE PALLETS

Strong, lightweight, fire-resistant, and self-cleaning, Tri-State Pallets offer the further advantage of eight-way accessibility. Their unusual base design permits fork entry at corners, as well as at sides, and ends. Trucks can place them in exactly the position desired or pick them up from any position even in congested areas.



TRI-STATE CONVEYOR GUARD

Follows your conveyor line exactly, along rises or dips, and around corners. Engineered in sections for easy installation—which is made still easier by the light weight of the wire construction. Available in various mesh sizes, according to the material conveyed. Just send us a blue print of your overhead conveyor line, and we will be glad to give full details.

CARGOTAINER DIVISION

Write for our NEW CATALOG

MEMBER

TRI-STATE ENGINEERING COMPANY

320 W. Beau Street
Washington, Pennsylvania

Automotive Production

WEEK ENDING	CARS	TRUCKS
Nov. 9 1957*	137,404	22,417
Nov. 2 1957	126,139	21,226
Nov. 10 1956	132,087	21,190
Nov. 3 1956	117,583	18,837
TO DATE 1957	5,172,077	944,082
TO DATE 1956	4,807,433	962,581

*Preliminary Source: Ward's Reports

that will be easier and safer and reduce the need for power steering.

8. More economical servicing and maintenance procedures.

9. Simplification of design and components for all sizes of trucks so that in a large truck fleet of many-sized units, there is parts interchangeability.

Cash Interpretation—What would these changes ultimately mean? The GM executive pointed out:

"We are in the business of designing and manufacturing trucks where even a small improvement means literally millions of dollars in cost savings for the operator, the shipper and the consumer.

"The significance of any kind of progress at all in truck design might best be stated in the dollar sign symbol."

The Benefits — Mr. Monaghan listed these resultant annual savings if certain economy advances were applied to the present fleet of 1,460,000 trucks used by private, for-hire and exempt commodities carriers:

Improvement of gasoline and diesel fuel mileage by one mile per gallon would save $800 million.

Reduction of mileage between major engine overhauls by 100,000 miles would save upward of $325 million a year.

Cutting the weight of highway tractors by 500 lbs would permit added cargoes worth $730 million annually.

Extra cargo space built into trailers of existing fleets would be worth hundreds of million of dollars extra revenue.

Safety a Dividend — An added savings would result from more comfort for the driver, better steering, better riding, better braking and easier driving. "Although this figure would also run into the hundreds of millions of dollars in savings," Mr. Monaghan said, "I would prefer looking at it in a saving of human lives."

Other truck specialists have also expressed a belief changes in styling and design are on the way.

Ugliness Unnecessary—Theodore Ornas, chief styling engineer in the advanced engineering group of International Harvester's Truck Div., and Willys P. Wagner, executive stylist in the Ford truck-exterior studio, delivered papers before the 12th annual convention of the American Society of Body Engineers.

Mr. Ornas observed improved styling of trucks is "just beginning" but changes will be tempered by a realization the vehicle must earn a profit for the purchaser. But trucks do not have to be ugly in order to be functional, he said.

Stylist Wagner observed glamor is becoming more and more important in truck styling—at little or no cost to the buyer. He pointed to truck interiors as an example.

Mr. Wagner philosophized the future of commercial vehicles: "Trucks will never again be the country cousins they once used to be."

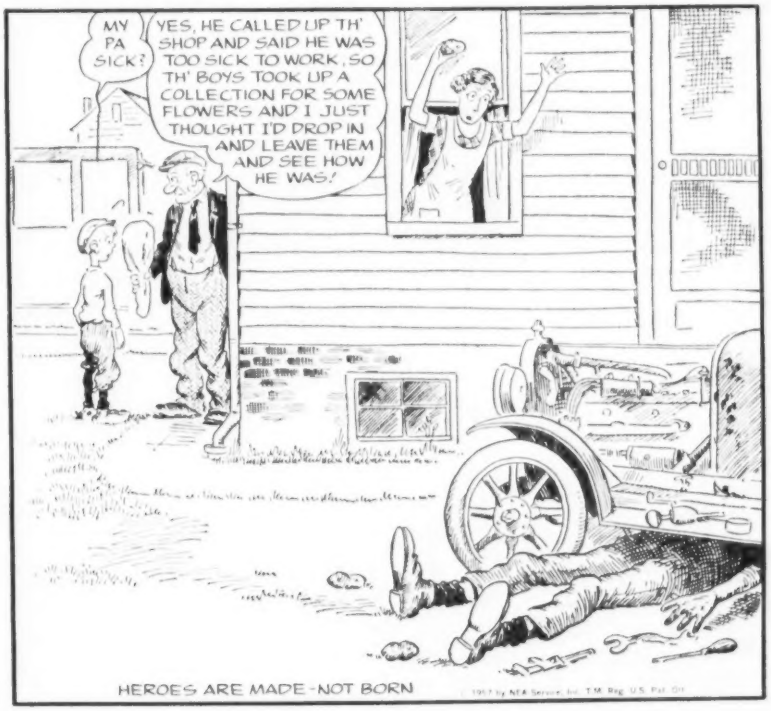
Chrysler, Auto-Lite Sign Pact

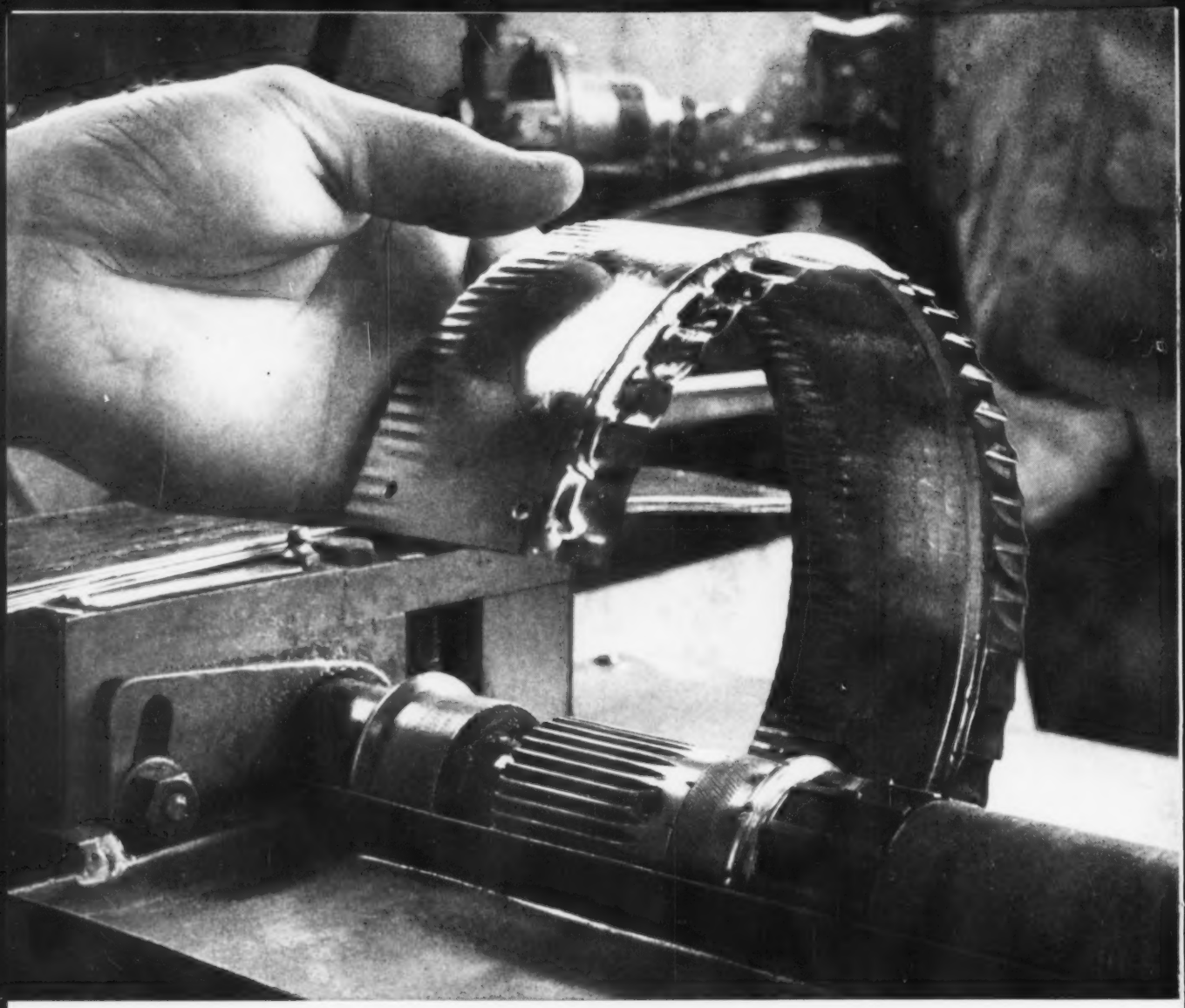
Electric Auto-Lite Co. and Chrysler Corp. have signed a contract tieing Chrysler and the Toledo auto parts manufacturer together for at least three more years.

Chrysler, one of Auto-Lite's principal customers, has recently indicated an intention to manufacture some of its own electrical equipment. Specifically mentioned are starting motors, generators, distributors and voltage regulators.

Helping Hand — The contract provides for Chrysler to purchase substantially all of its requirements for these items from Auto-Lite. In exchange, Auto-Lite will assist the automaker in establishing its own manufacturing facilities for these items.

THE BULL OF THE WOODS By J. R. Williams


MY PA SICK?
YES, HE CALLED UP TH' SHOP AND SAID HE WAS TOO SICK TO WORK, SO TH' BOYS TOOK UP A COLLECTION FOR SOME FLOWERS AND I JUST THOUGHT I'D DROP IN AND LEAVE THEM AND SEE HOW HE WAS!
HEROES ARE MADE-NOT BORN



"WE USE WEIRKOTE® ONLY— ITS ZINC COATING IS FOR KEEPS!"

You come across that thought a lot when you talk with users of Weirkote zinc-coated steel.

Ask *why* they're so sold and you hear that Weirkote gives a better job at *lower* cost. Weirkote fabricates easily. Takes the toughest crimping, bending, twisting, lock seaming, the deepest draws. Its tight zinc coating stays on for keeps.

With Weirkote zinc-coated steel there's no need for costly protective plating, painting or redipping after fabrication. Makes a good-looking job anyone can be proud of. And it stays that way.

Weirkote is continuous-process zinc-coated steel at its best—highly resistant to corrosion, heat and noise. Cost from sheet to finished product is low.

Send for Weirkote Booklet

Look into Weirkote for added efficiency, economy in your operation. For free booklet, write today to Weirton Steel Company, Dept. B-3, Weirton, West Virginia.

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What About a Dept. of Research?

Subsidized Scientific Training Advocated

Sen. Mansfield links plan to finance scientific education to a proposal for a Secretary of Research and Development.

It's one of many plans that are stirred up by the missile hassle.—By G. H. Baker.

▪ In Washington, there's renewed demand for new federal funds to educate science students.

Senator Mike Mansfield, D., Mont., is calling for creation of a new Cabinet position, that of "Secretary for Research and Development." The Secretary's job would be to direct all education in schools and colleges related to missiles, rockets, and travel in outer space.

No Time to Waste—The Russions are ahead of us in space progress because the Moscow government has complete control over all science students and workers in the scientific professions, he states.

To catch up, says Mansfield, the U. S. government should start immediately to subsidize all science students, beginning with high school sophomores.

Those qualified would have their government support continued through four years of college, and those especially gifted would continue to have their bills paid by the government in their postgraduate years.

The Senator says he'll push for public hearings before a congressional committee soon after the new session of Congress begins in January.

Why No Overtime? — Congress wants to know why government missile-and-rocket activities are still on a 40-hour week. Under Pentagon orders, all government employees at the huge Cape Canaveral (Fla.) test station stay away from their jobs on Saturdays, Sundays, and holidays. Questions on why the Canaveral tests are not now on a round-the-clock basis, or at least on two shifts, will be raised.

Tariff Cuts Will Be Opposed

Congress is to be asked early in 1958 to vote a five-year extension of the tariff-cutting reciprocal-trade law, and to grant the State Dept. wider authority to enter into low-tariff pacts with other nations.

But there is rising sentiment within Congress against further tariff reductions. Many manufacturers are telling Congress the slow pace of orders placed at U. S. mills and factories in recent months is due primarily to a rising volume of imported items.

In recent years, the U. S. State Dept. has exercised its authority to cut tariffs by an average 5 pct a year. The new Administration request for extension of the trade law probably will include a bid for extending this authority.

Rail Merger Gets Close Scrutiny

Watchful Waiting—Government agencies are waiting to hear more about the proposed New York Central-Pennsylvania Railroad merger before they take a stand on it.

Most interested agencies are the Justice Dept., because of possible antitrust issues, and the Interstate Commerce Commission. The ICC, as the regulatory authority for the railroads, would have to be shown that a merger would benefit the public and have no harmful effect on competition.

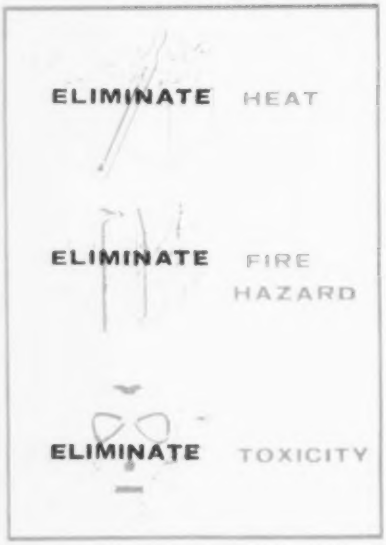
Questions to Answer—Officially, the Justice Dept. has little to say now as to the proposal, referring to it only as an ICC matter. And the ICC won't declare a position until the two roads offer a plan to combine. ICC believes the railroads may require many months to come up with such a plan.

Going on at this time are rail line studies designed to answer these questions: Would the two roads operate more economically as a single system? How would a merger system benefit shippers, the traveling public, and the communities served? Would a combined operation work to the best interests of stockholders and employees?

Income Down—The Central and the Pennsylvania are the largest U. S. railroads in terms of freight tonnage and gross revenues. The Pennsylvania leads in these categories. Both roads, however, have reported a drop in net income this year, compared with 1956 figures.

Combined assets of the companies would have an estimated value of between $5 billion and $6 billion. A merger resulting in assets of this amount would have to pass close inspection by federal anti-monopoly officials.

CLEAN AS A WHISTLE—with HOUGHTON Cold Cleaners



HOUGHTO-CLEAN COLD CLEANERS

The first job of a cleaner is to CLEAN. And that's where the new Houghton Cold Cleaners won the approval of production men. Working at room temperature in either still tank or power washers, Houghton Cold Cleaners do a better, quicker, more thorough job at less cost. And they also offer many other advantages.

Cold cleaners eliminate the need for expensive water heating equipment and high fuel costs.

Because they spray on, drip off, and carry all manner of oil and soil with them, they cut cleaning time.

Because shops stay cooler and parts handle more comfortably, morale is high. Production holds up all the year round.

Find out how Houghton Cold Cleaners can add "extras" to your profit picture. Call the Houghton Man or write direct to E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

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E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Don't Sell the West Coast Short

Expansions Prove It Economically Sound

While aircraft layoffs are disturbing, a look at new or expanding firms in the Far West is reassuring.

Among planned moves: Kaiser Steel will spend $2 million on enlarging its fabricating facilities.—By R. R. Kay.

■ There's still abundant evidence that the West Coast is economically healthy. It's true that industry there is taking a few hard knocks. Each week more thousands of aircraft workers are laid off.

But this still does not change the overall picture of industrial growth —only slows it down.

More Fabricating—Here are the latest metalworking firms setting up shop or expanding:

Kaiser Steel Corp. is spending $2 million to expand its Fabricating Div. at Napa, Calif. The company will almost double its pipemaking capacity there.

Welding, facing, expanding and testing facilities, and storage will all have more space. The plant's product line will run up to 42 in. diam. Big customers: natural gas and petroleum industries.

Attention Salesmen — H & B American Machine Co., Culver City, Calif.—makes aircraft and missile parts. Handy & Harman, El Monte, Calif.—precious metal fabricators. Rain-Jet Corp., Burbank, Calif.—lawn and agricultural sprinklers.

Central Brass & Iron Foundry Co., Portland, Ore.—new foundry. California Metal Processing Co., Los Angeles—metal finishing shop. United States Chemical Milling Corp., Manhattan Beach, Calif. Webb Precision Products, Santa Monica, Calif.—machine shop.

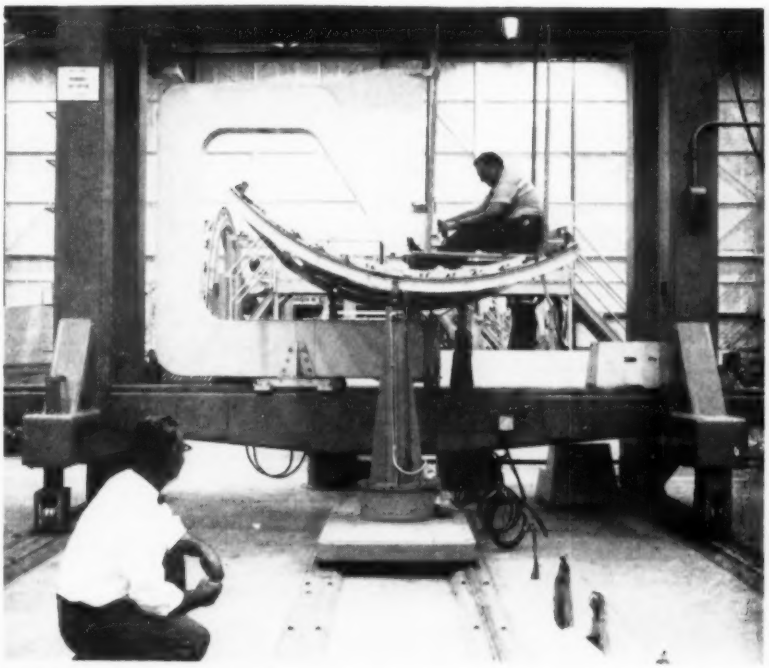
Forgings, Castings, Dies — H-L Metals & Engineering Ltd., Kelowna, B. C. — steel forgings. Aireloom Bedding Co., Alhambra, Calif.—box springs. Don-Ray, Inc., El Cajon, Calif.—machine shop.

Collins Microflat Co., Hawthorne, Calif.—surface plates. Almco Manufacturing Co., Gardena, Calif.—automobile mufflers.

Aircraft, Rubber, Electronics—Alumac Co., South Gate, Calif.—aluminum anodizing service. Trade-Wind Motorfans, Inc., Rivera, Calif. —residential and industrial ventilating equipment. Summit Industries, Inc., Gardena, Calif.—aircraft parts. Rubber Dynamics, Inc., Gardena—industrial rubber products. Ralph S. Thacker Co., Inc., Burbank, Calif.—electronic parts.

Ryan Aeronautical Co., San Diego, will double its floor space at Torrance, Calif. The company uses the present 137,000-sq-ft facility for Firebee target drone missile assembly. The added space will be for stepped up production of the Firebee and work on Douglas DC-8 Jetliner jet engine power packages and pylon assemblies. Completion date is set for spring 1958.

Riveting Operation Taken to the Work



ASSEMBLY SPACE SAVER: While fuselage panel for Douglas DC-8 jetliner is held on sensing fixture, Manco-Crispin gantry riveter moves around its full length, riveting and shaving excess rivet material.

the NEW MARVEL SAWING DEMONSTRATION ROOM!

The Complete Marvel Line of Hack Saws and Band Saws Operating!

...available for demonstration or testing on your own material!

How would you like to run sawing tests on your own material... watch demonstrations under actual working conditions, of the world's most modern hack saws and band saws—and compare, if you wish, band sawing and hack sawing to see which type of saw is best for you?

You are cordially invited to come in to see and make use of the Sawing Demonstration Room—the most complete and up-to-date facility of its type in the country. Staffed by experienced metal sawing engineers and technicians, the Sawing Demonstration Room has been set up for your convenience. We sincerely believe you will find it interesting and helpful in your selection of metal sawing equipment.

Here, you will see the most modern single cut and automatic bar feed hack saws and band saws (including the *all new* MARVEL No. 81 and 81A Universal Hydraulic Band Saws equipped with the amazing "TRUE-LINE" Automatic Blade Control (Basic Patent Applied For) and using High Speed Steel Band Saw Blades.)

If you have any type of sawing problem, or if you would just like to come in and see a demonstration of the fine cutting MARVEL Saws can do, the Demonstration Room is always open to you.

MARVEL *Metal Cutting* SAWS

ARMSTRONG-BLUM MFG. CO.
5700 W. BLOOMINGDALE AVE., CHICAGO, ILL.

Sales of Imported Tools Climb

Jump 60 Pct in First Six Months of '57

European tool builders heard for years their units were underpowered and too light by American standards.

Challenge was accepted and now they ring up U. S. sales with better-quality, low priced tools. —By E. J. Egan, Jr.

■ You can't argue with arithmetic. U. S. imports of foreign-built machine tools in the first six months of this year were 60 pct above the same period in 1956. In dollars, this sales volume represented about 3½ pct of that achieved by American builders in the domestic market, and the trend is inching upwards.

These facts were read into the record at the 56th Annual Meeting of the National Machine Tool Builders' Assn.

Quality Helped—What's behind this rise in imports? Seemingly, it's a combination of several factors: Low prices (reflecting European wage rates and U. S. import tariffs), more effective sales and service policies, and—not unexpectedly—better-quality equipment.

For years, European builders have been told that their machine tools were underpowered and too light, by American standards. To some degree, at least, this long-standing challenge appears to have been accepted; certain trends were common to all nations exhibiting at the recent Fifth European Machine Tool Exhibition in Hanover, Germany.

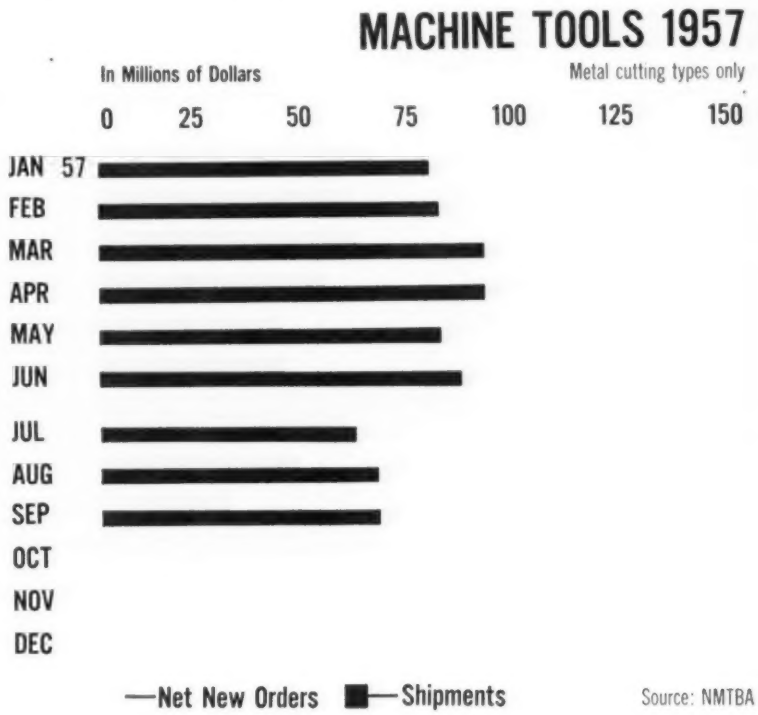
More Power and Speed — Many equipment items showed increased power and speed, stemming from developments in electric, electronic and hydraulic drives. Tools were rigged with a variety of attachments for both simplifying and accelerating sequential operations.

West Germany, the largest exhibitor in terms of companies occupying space, showed a number of automatic bar machines built on orthodox lines. German builders are going in for more automatic production on turret and other lathes, using power driven, automatically controlled chucks, and sequential loading and unloading equipment.

Their multiple-spindle drilling machines, also, show progress in adaptability and automatic control features. Automatic operation is rapidly being extended to grinding and honing machines, profiling units, gear shapers and broaching equipment. Most automatic cycles are actuated by well-known cam or indexing devices, however. Magnetic tape, punched card or punched tape controls are conspicuously absent on West German machine tools.

Trends by Nations — Among Swiss builders of drilling equipment there is a growing trend toward the use of high-precision features on large machines. Among the many displays of improved grinders was a thread grinding unit whose automatic cycle included return motion and dressing of the grinding wheel.

Italian exhibitors demonstrated considerable progress in automatic control, especially in remote control of lathes by means of photo electrically sensed punched cards. In this form of machine control, the Italians appear to lead the Germans.



INDUSTRIAL BRIEFS

Patented Grinding — A porous grinding wheel produced by Electro Refractories & Abrasives Corp., has been awarded U. S. patent protection. The wheel utilizes minute balloon-like particles or brittle sponge-like rigid metals that break away to form "air conditioned" voids in the cutting surface when the wheel is in use. The patent was awarded to N. P. Robie, asst. research director, and assigned to the company.

Ground Breaking for Circuit Breaking — Westinghouse Electric Corp. will build a multimillion-dollar power circuit breaker plant in Trafford, Pa., early in 1958. Contracts for the structure have been awarded to Kaiser Engineers, Div. of Henry J. Kaiser Co. of Oakland, Calif. The Trafford plant will be a one-story structure with a total of 241,000 sq ft of manufacturing space. The plant will be in full operation by 1959.

Porter at Work — H. K. Porter Co. will construct a modern tunnel kiln refractories plant at Bessemer, Ala., as part of a $1 million program. A general rehabilitation program at this plant will include new materials handling equipment and brick making machinery. Swindell-Dressler Corp. has been awarded the contract. Groundbreaking will begin within sixty days, and completion is scheduled for the fall of 1958. New units will utilize present clay grinding and batching facilities at Bessemer Works.

A New Home — The headquarters offices of the U. S. Steel Homes Div. of the U. S. Steel Corp. will be consolidated in Pittsburgh, Pa., on Jan. 1. Purpose is to increase the efficiency of its services and to consolidate management functions currently divided between its Harrisburg, Pa. and New Albany, Ind., plants. The division's general offices will be located in the Frick Bldg., Pittsburgh.

Bronze Star—The Steel Founders Society of America presented its "National Bronze Award" to Robert Eichenberg, chief engineer for the McEvoy Co., producer of oil field equipment. Basis of the award was Mr. Eichenberg's paper on development of a triple high pressure oil field valve, produced by McEvoy to permit production from three depths in a single oil well.

Start Digging — Crucible Steel Co. of America has acquired rights to more than 15,000 surface acres of additional coal reserves. The acreage, located at Hugheston, W. Va., is expected to yield in excess of 20 million tons of number two gas seam high volatile metallurgical coal. The new reserves will enable Crucible to extend the span of operations at its present mine, Greene County, Pa., from an estimated 18 more years to about 35 more years.

Ticket to Jamaica—Harvey Aluminum now readying its 54,000-ton reduction plant at The Dalles, Ore., will soon begin prospecting for bauxite on all government owned lands in Jamaica. Jamaica has reserved all government owned lands throughout the 4,111-sq mi British Colony exclusively for bauxite prospecting by Harvey Aluminum for the next 3 years.

To the Windy City—The Carpenter Steel Co. has opened a larger mill branch warehouse and office in Chicago for specialty tool, stainless and alloy steels. It will be midwestern headquarters for the main company and its Alloy Tube Division. The division will use the new offices as the base of operations for a sales territory embracing 18 midwestern states.

Reynolds to Rhineland — Reynolds International and Julius & August Erbsloeh of Wuppertal, W. Germany, have formed an aluminum manufacturing and sales company in W. Germany. German firm will be named Reynolds-Erbsloeh Rohrblech GMBH. New company will manufacture and sell Reynolds patented tubed sheet.

Order the Champagne — Ingalls Shipbuilding Corp., Birmingham, Ala., was low bidder for construction of five cargo-passenger ships for the Maritime Commission, which will lease them to Lykes Steamship Co. of New Orleans. Ingalls edged the New York Shipbuilding Corp. with a bid of $52,935,000 for the five ships and $48,124,000 on an adjusted bid basis. Awarding of the final contract is expected in about 30 days, according to R. I. Ingalls, president of Ingalls.

Reactor Goes to College — A nuclear reactor course has been added to the chemical engineering curriculum at Lehigh University. New course considers the engineering problems in nuclear reactor design and operation. Topics include instrumentation and control, reactor fuels and materials, thermal aspects, radiation protection and shielding, fuel processing and reactor design.

Radiation Information—An information center has been established by the Air Force at Battelle Memorial Institute, Columbus, O. The facility will gather and disseminate data concerning the effects of nuclear radiation on materials and systems which may be required in aircraft of the future. It will be known as the Radiation Effects Information Center.

DeALL users say Band Sawing is the

39 Sources

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CENTRAL SCREW COMPANY
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Keene, New Hampshire

CLEVELAND CAP SCREW CO.
Cleveland 4, Ohio

CONNECTICUT SCREW & RIVET CO., INC.
Waterbury 20, Connecticut

CONTINENTAL SCREW CO.
New Bedford, Massachusetts

ECONOMY SCREW CORP.
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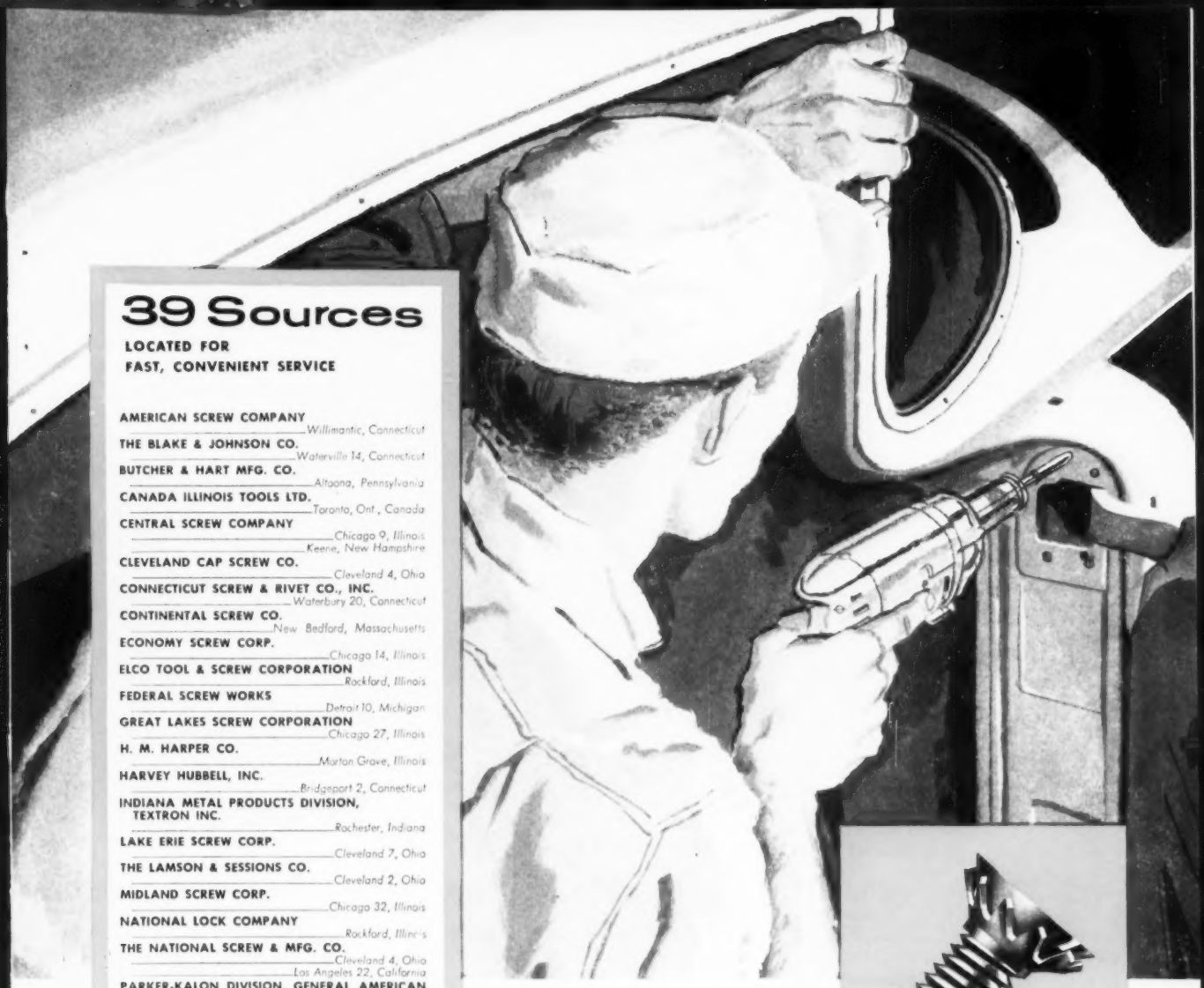
Rockford, Illinois



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Sems

pre-assembled screw and lock washer

Sems is a development of Illinois Tool Works, Chicago

G. C. Wells, appointed president,

MEN IN METALWORKING

DoALL users say Band Sawing is the fastest, lowest cost CUT-OFF Method!

Typical blanks and parts cut-off with the DoALL Automatic Power Saw, showing unlimited range of this versatile band machine.

Mr. Paul Zellers (left) is Maint. Supt. of the Clifford-Jacobs Forging Co., Champaign, Ill. His cut-off department sets the pace for the company's forging operation which must turn out an unusually wide range of jobs 24 hours a day, seven days a week! This challenge to the cutting-off operations is met by two automatic DoALL Power Saws that are giving phenomenal performance: "*We increased production 200% on multiple billet cutting . . . We get up to 15,000 sq. in. blade life cutting #1040 type billets . . . 100% savings in waste metal . . . No down time for maintenance.*"

WHAT OTHER USERS SAY . . .

"The ability of the DoALL Power Saw to cut 4½" round oxygen-free copper within .005" and in less than two minutes per cut more than proved its worth . . ."—*L. Cavelier, Concord, Mass.*

". . . In the 19 months since we bought our DoALL Power Saw, we have used only 31 saw bands, which we feel is quite remarkable inasmuch as the machine has been used almost continuously—24 hours a day."—*Southwest Ornamental Iron Co., Kansas City, Mo.*

". . . we find we can hold our stock for finishing at a minimum as the saw cuts are accurate within a few thousandths."—*The Independent Machine Co., Cuyahoga Falls, Ohio*

"Since we have installed two new DoALL Power Cut-Off Saws equipped with Demon High-Speed Saw Blades, our production has increased from 200% to 300%."—*The Ridge Tool Co., Elyria, Ohio*

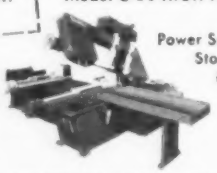
"Savings on material alone over the old method pays for the blades."—*Beaver Pipe Tools, Inc., Warren, Ohio*

"Blade life on alloy steels has averaged close to 5000 sq. in., and on HSS better than 6000 sq. in. Maintenance costs have been practically nil."—*Goddard & Goddard Co., Detroit, Mich.*

REDUCES CUT-OFF COSTS 5 WAYS!

1. **DoALL CUTTING SPEED**—up to 6 times faster than other band saws, and 2 to 3 times faster than power hacksaws!
2. **DoALL ACCURACY**—equals or exceeds that of most other cut-off equipment. HSS blade has guaranteed tooth set accuracy of ± .002".
3. **DoALL TOOL COST**—Demon High-Speed Steel Blade lasts up to 30 times longer than carbon steel blades—keeps tool costs low!
4. **DoALL MATERIAL SAVINGS**—thin blade (only 1/16" wide) cuts narrow kerf, giving you substantial "material saved" bonus with every cut!
5. **DoALL MACHINE INVESTMENT**—less than power hacksaws and cold saws of comparable capacity!

Model C-58 HIGH PRODUCTION



Power Saw, Automatic Stock feed indexing. (12" x 12" capacity.)

BIG MATERIAL SAVINGS!

The thin Demon *High-Speed Steel* Blade (only 1/16" wide) reduces your material waste—gives you a substantial "material saved" bonus that mounts with every cut.

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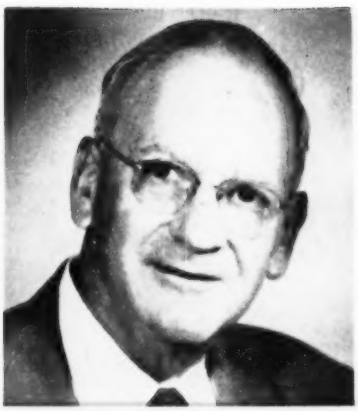
G. C. Wells, appointed president, Union Carbide International Co., Div. of Union Carbide Corp.

G. T. Hubbell, elected president and **T. M. Keefe,** elected executive vice president and treasurer, The Seymour Mfg. Co., Seymour, Conn.

G. C. Johnson, named president and general manager, Rehnberg-Jacobson Mfg. Co.



J. F. Cain, named controller and asst. treasurer, Greer Hydraulics, Inc.

H. W. Hartman, appointed asst. general superintendent, Cuyahoga Works and **F. A. Fink,** appointed works superintendent, American Works, America Steel & Wire Div., U. S. Steel Corp.

J. M. Carman, appointed staff assistant to the director of steel sales, A. M. Byers Co., Pittsburgh.

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G. C. Wells, appointed president, Union Carbide International Co., Div. of Union Carbide Corp.

G. T. Hubbell, elected president and **T. M. Keefe,** elected executive vice president and treasurer, The Seymour Mfg. Co., Seymour, Conn.

G. C. Johnson, named president and general manager, Rehnberg-Jacobson Mfg. Co.

W. F. Kruspe, elected president and general manager, Valvair Corp. —Sinclair-Collins Valve Co.

W. L. Wearly, elected president, Joy Mfg. Co., Pittsburgh; **A. B. Drastrup,** elected executive vice president.

W. H. Powell, elected vice president, International Resistance Co., Philadelphia.

C. A. Woodley, elected executive vice president, Caterpillar Tractor Co., Peoria, Ill.

A. G. Scott, named manager, Detroit district sales office, Pittsburgh Steel Co.

J. E. Collins, elected chairman of the board, Valvair Corp.—Sinclair-Collins Valve Co.

G. J. Parker, appointed general manager, Norden-Ketay's Florida Gear Div., Miami, Fla.

J. P. McNally, named product manager, Philadelphia plant, Arcflux Corp., subsidiary of Arcos Corp.

L. E. Tompkins, promoted to manager, Credit Dept., The Dow Chemical Co.

L. E. Hammond, elected president, Lehigh, Inc., Easton, Pa.; **L. M. Bissett** and **C. L. Coulter,** elected vice presidents.

W. R. Holmes, appointed manager, Newark Warehouse, U. S. Steel Supply Div., U. S. Steel Corp.

J. F. Cain, named controller and asst. treasurer, Greer Hydraulics, Inc.

H. W. Hartman, appointed asst. general superintendent, Cuyahoga Works and **F. A. Fink,** appointed works superintendent, American Works, America Steel & Wire Div., U. S. Steel Corp.

J. M. Carman, appointed staff assistant to the director of steel sales, A. M. Byers Co., Pittsburgh.

C. A. Headlee, appointed asst. comptroller, Universal Atlas Cement Co., subsidiary of U. S. Steel Corp.

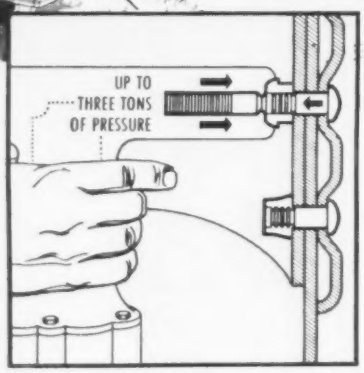
J. B. Graham, named director of research, Buffalo Forge Co., Buffalo, N. Y.

R. F. Derr, appointed asst. general manager, sales, Jones & Laughlin Steel Corp.

D. G. Collins, named vice president, Speedway Mfg. Co., Cicero, Ill., subsidiary of Thor Power Tool Co. of Chicago.

C. E. Johnson, appointed asst. general manager, Sparrows Point, Md., plant, Bethlehem Steel Co., Bethlehem, Pa.

M. S. Lebair, named asst. vice president, marketing, York Corp., York, Pa., subsidiary of Borg-Warner Corp.; **W. L. Pharo,** named manager, contract products; **R. G.**



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Werden, named general sales manager, engineered equipment; **R. E. Cassatt,** named general sales manager, packaged products.

K. E. McKown, promoted to asst. manager, Steel Sales Div., Firth Sterling Inc.

C. J. Goodman, Jr., appointed product sales manager, Semiconductor Products Dept., General Electric Co., Syracuse, N. Y.

E. W. Moffitt, appointed general manager, Bridgeport, Conn., plant, Heppenstall Co.

A. F. Skipp, Jr., appointed sales manager, The Herr Equipment Corp.

W. J. Borwick, promoted to manager, Chicago district warehouse, U. S. Steel Supply Div., U. S. Steel Corp.

C. A. Kuhnmuench, appointed sales manager, Chicago, Indianapolis, St. Louis district, Trent Tube Co., subsidiary of Crucible Steel Co. of America, Chicago headquarters; **W. H. Collins,** named sales manager, Pittsburgh, Cleveland, Cincinnati district, Pittsburgh headquarters.

W. B. Hammond, appointed sales manager, American Metal Hose

H. T. Silverman, appointed general manager, Fabricating Div., The

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ager, Pittsburgh, Cleveland, Cincinnati district, Pittsburgh headquarters.

J. E. Shondel, appointed Government sales manager, International and Development Corp., Columbus, O.

L. E. Jolls, appointed manager, Quality Control Dept., Tractor and Implement Div., Ford Motor Co., Birmingham, Mich.

W. B. Hammond, appointed sales manager, American Metal Hose Div., The American Brass Co., Waterbury, Conn.

W. P. Roach, appointed Eastern regional manager, Eastern sales region, McKinney Mfg. Co., Pittsburgh.

R. B. Peterson, named sales service manager, Chicago district sales office, Steel Div., Copperweld Steel Co., Warren, O.

R. A. Woofter, promoted to metallurgical contact engineer, Jones & Laughlin Steel Corp.

Joseph Muscarella, appointed sales representative, Kentucky-Tennessee area, Hanson-Van Winkle-Munning Co., Matawan, N. J.

B. R. Kelly, appointed branch manager, Chicago sales office, Colson Corp., Elyria, O.

A. W. Escoffier, appointed manager, Seattle branch, Thor Power Tool Co. of Chicago.

H. T. Silverman, appointed general manager, Fabricating Div., The Plume & Atwood Mfg. Co.

J. R. McAllister, promoted to manager, purchasing, Government and Industrial Div., Philco Corp., Philadelphia.

T. J. Payne, elected treasurer, J. Bishop & Co. Platinum Works, Malvern, Pa.

D. C. Albright, named manager, manufacturing, Building Products Div., American Welding & Mfg. Co., Warren and Niles, O.

R. J. Hume, appointed manager, Dome sales, Kaiser Aluminum & Chemical Sales, Inc.

F. N. Nolan, appointed superintendent, maintenance, Buffalo Steel plant, Republic Steel Corp.

John Betzhold, of Ross Cook, Inc., Los Angeles, named Southern California representative, The Spen-

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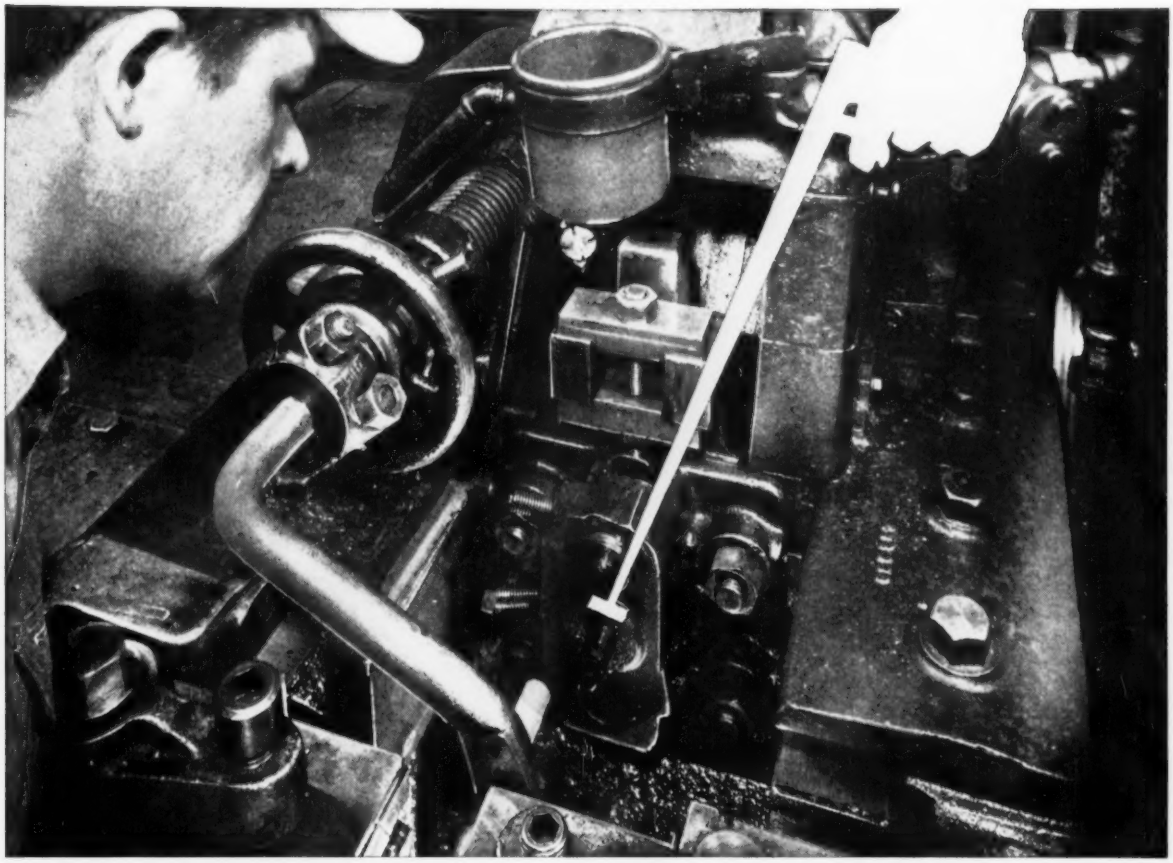

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J. P. Wettach, named lubrication engineer, Engineering & Construction Div., Dravo Corp., Pittsburgh

C. J. Bliemeister, named purchasing agent, A. O. Smith Corp.'s Granite City, Ill. auto frame plant.

H. E. Love, appointed special representative, Summerill Stainless Tube Div. Sales, Columbia Steel & Shafting Co., Pittsburgh.

B. M. Daugherty, appointed sales representative, Special Products Div., The Chicago Screw Co., Bellwood, Ill.

E. H. Anderson, appointed asst. to works manager, Edward Valves, Inc., subsidiary of Rockwell Mfg. Co., E. Chicago.

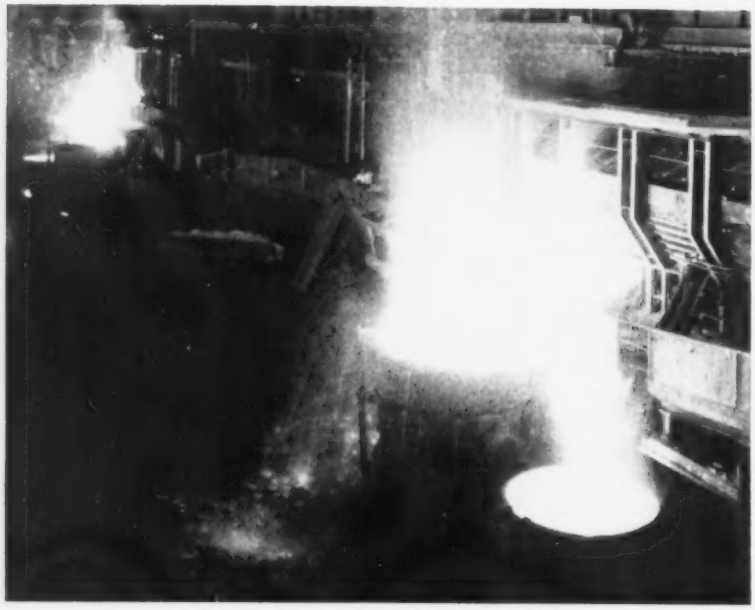
J. C. Abbey, appointed chief engineer, Jackson Engineering Dept., Aeroquip Corp., Jackson, Mich.

F. B. Becker, appointed industrial engineer, Rockbestos Products Corp., New Haven, Conn.

T. L. Strimple, elected president, The National Acme Co., Cleveland.

E. A. Harris, appointed manager, aluminum and pig ingot sales, Revere Copper & Brass Inc.

D. A. Olson, appointed works auditor, Gary Steel Works, U. S. Steel Corp.



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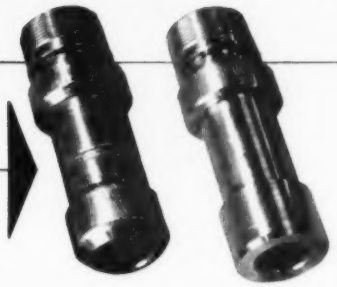

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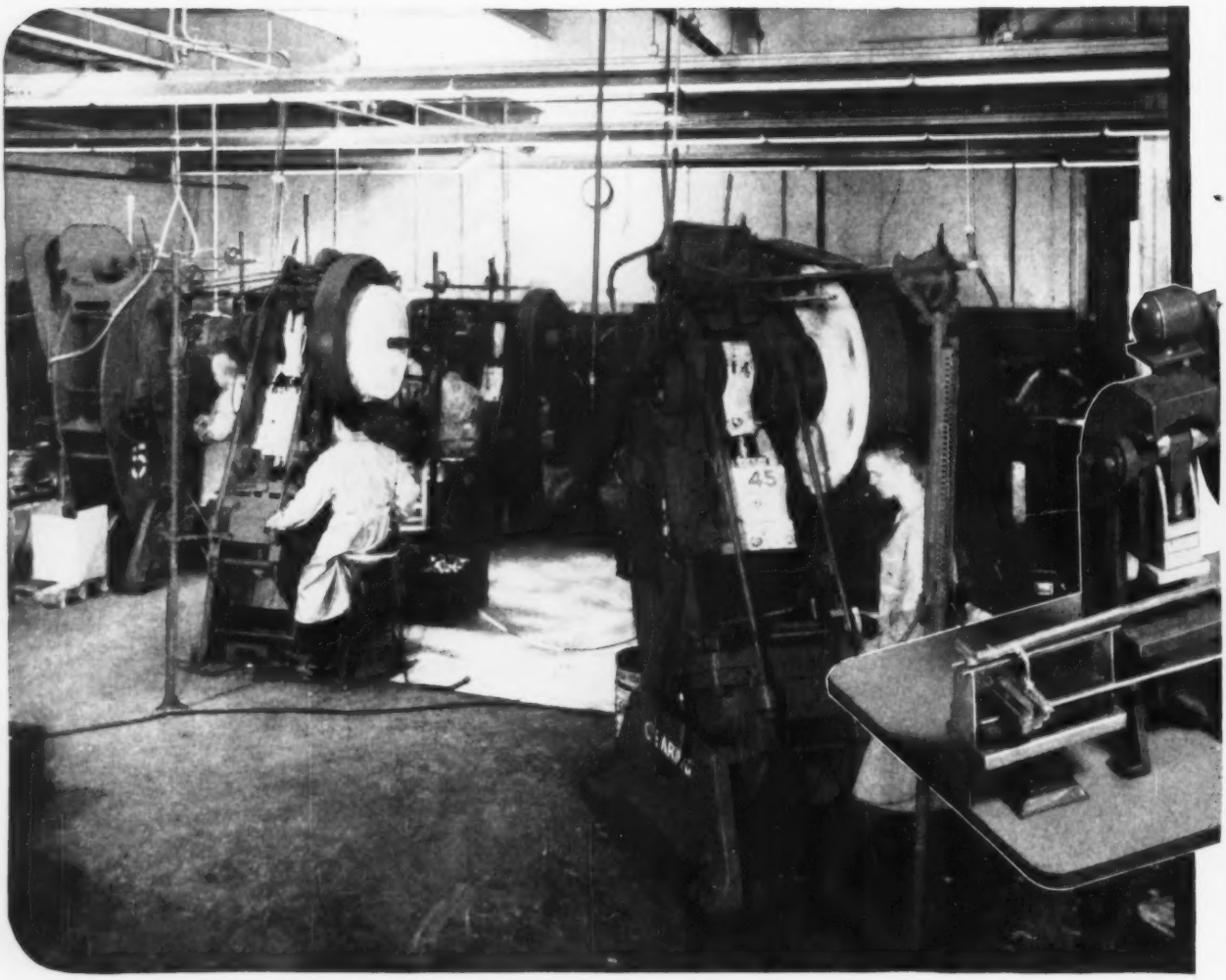

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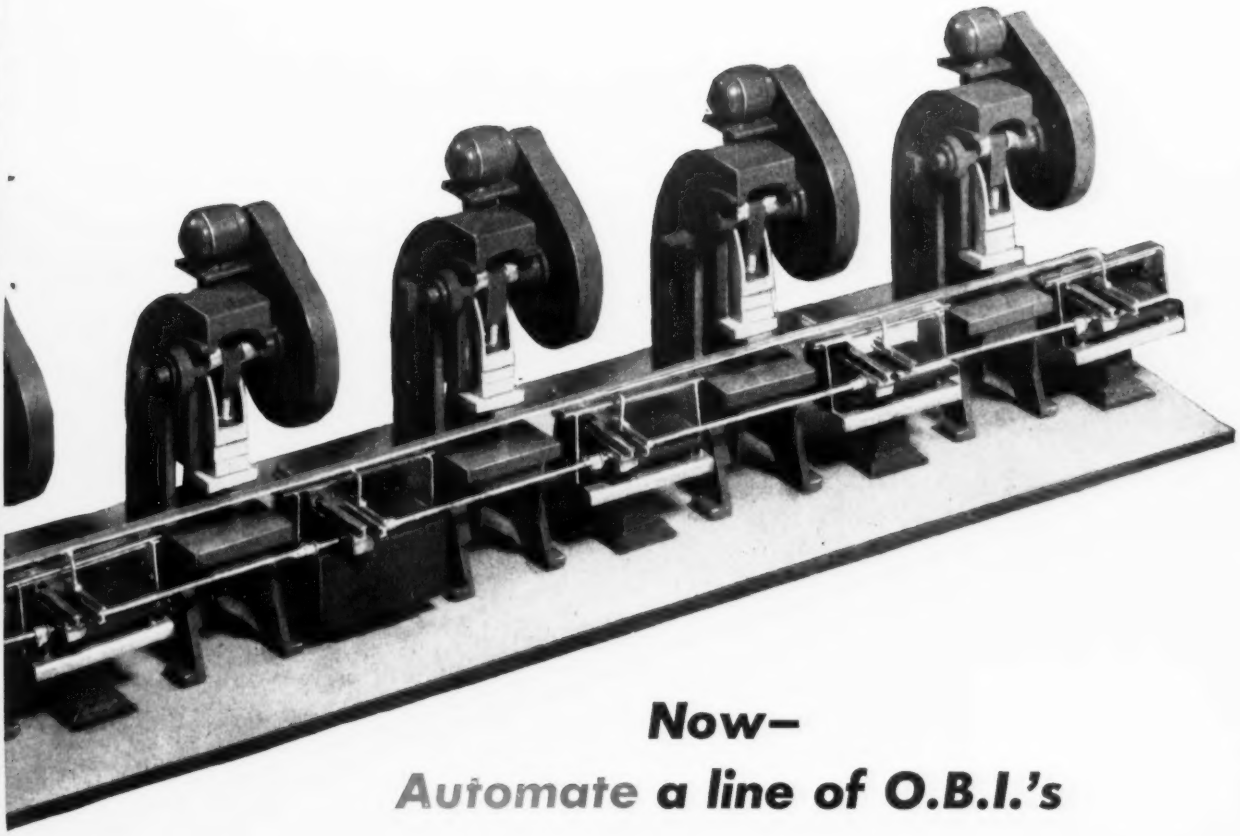

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Forgeability Tests: Are the Results Reliable?

By P. M. Unterweiser—Metallurgical Editor

The U. S. is the world's largest producer of quality forgings. Behind this record of production is a vast amount of technical know-how.

But will know-how alone suffice without a better knowledge of forgeability measurements?

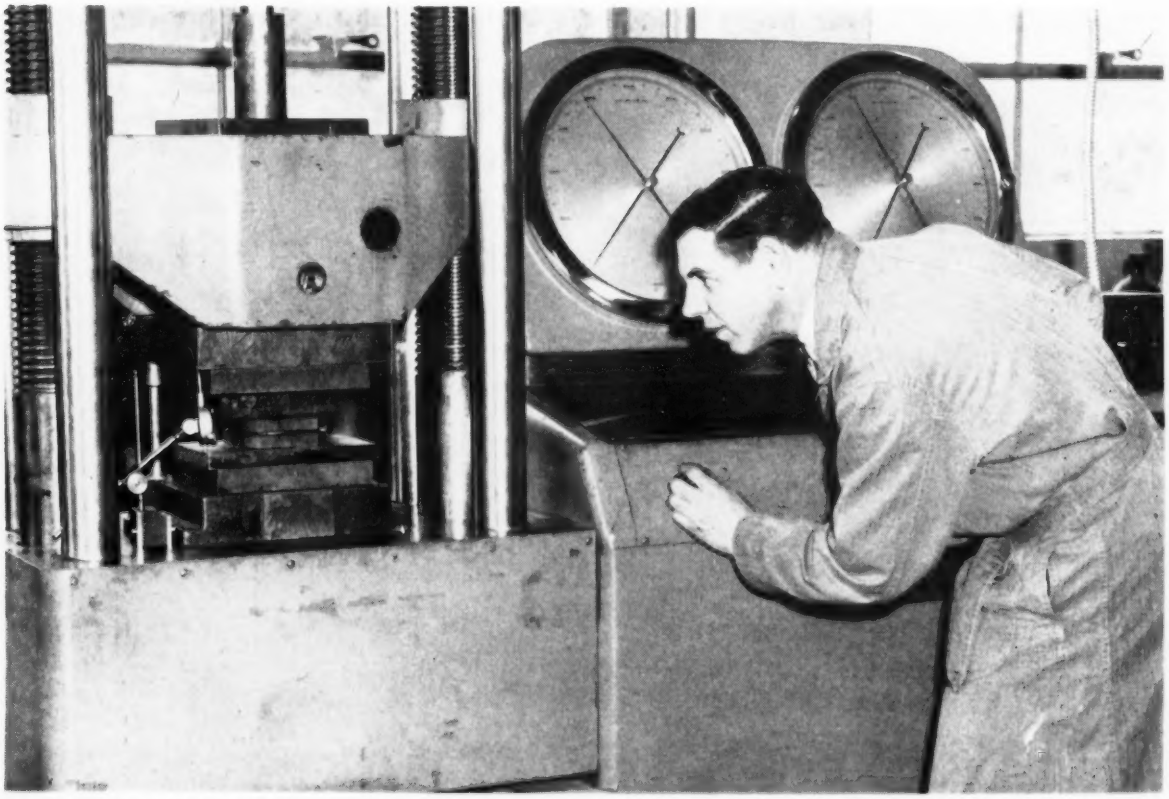
This is a vital question that needs to be answered—now.

▪ Forgeability is a word whose definition can't be found in standard dictionaries or most technical handbooks.

Still, its meaning is generally understood. It is a term used to indicate the relative ease or success with which a material is forged.

As a field of interest in the metalworking industry, forgeability has yet to enjoy the splash and dash afforded certain other coined "abilities", notably machinability and weldability. Even in technical circles, the study of metal forgeability (with few exceptions) has been noticeably neglected — even ignored.

Decisive Factor — None of this alters the fact that the science of measuring the forgeability of metals is of crucial importance. Even when its urgency is imperfectly understood, it remains a decisive factor in forging efficiency and production. In terms of costs and quality, its



SIMPLIFIES VARIABLES: A. B. Draper, whose detailed literature search showed little agreement on how forgeability should be measured, reduces the endless variables to just three main factors.

effects are invariably felt by the buyers of forgings.

Above all, its importance to the present and future status of our national defense is of a magnitude that demands immediate action. Unless far more emphasis is placed on the development and distribution of useful forgeability data, our military prospects in the future may be more precarious than even the pessimists suspect.

Emphasis Shifts—Thanks in part to its novelty, titanium is one metal whose forgeability has received a fair amount of systematic attention. But in aircraft and missile development, the emphasis on titanium has begun to relax. It is being replaced by a new emphasis on super-alloys, precipitation hardening alloys, high strength and tool steels.

In terms of forging requirements, what is being done to compensate for this change in emphasis?

There are plenty of signs of action on the part of individual forging plants. To this extent, some useful forging information is being derived—at least on a piecemeal or job-to-job basis.

Key Questions — But is this a really effective approach to the overall problem? Will it do much more than solve individual forging problems for a handful of forging plants?

The fact remains that virtually everything we know about forgeability has been derived on this same piecemeal basis.

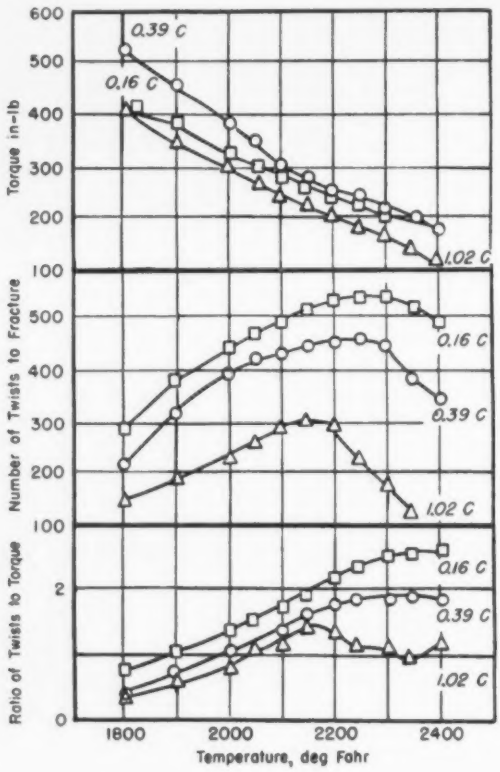
The standard explanation for lack of organized knowledge in this field is that the science of forgeability is fraught with too many variables, some of which may not be measurable. Consequently, each forging problem must be viewed separately. Useful generalizations, industry-wide standards are almost impossible to formulate.

Gray Not Black—The principal merit of this contention is that it is a fairly accurate description of the present status of forgeability measurements. But to accept it without qualification is to admit defeat.

Fortunately, enough is already known about forgeability measurements to prove that they are both possible and feasible. The picture may be gray, but it isn't jet black.

In a project conducted by the Syracuse University Research Institute, A. B. Draper recently surveyed the available literature on forgeability measurements as well as commercial practice. Although he found a "pronounced lack of agree-

ACTUAL CONDITIONS: Forgeability of superalloy sample is tested on a 2000-lb open-frame forging hammer at Wyman-Gordon Co., Worcester, Mass.



ONE APPROACH: Hot-twist tests measure flow stress and, to some extent, ductility, in this case are used to determine effect of carbon content.

OBJECTIVE: Turbine disc of high-temperature alloy is forged on 20,000-lb hammer at Wyman-Gordon.

ment" on how forgeability should be measured, he managed to define those quantities which forgeability tests should try to measure.

Important Three — Draper reduces the endless variables to three key factors most likely to determine the relative forgeability of any metal. These factors are flow stress (or internal friction), ductility, and friction coefficient (or external friction).

Both flow stress and ductility are inherent properties of the particular metal being forged. As for friction coefficient, Draper refers to this factor as a "complex physical constant." It depends on the efficiency of forging lubricants as well as "the mechanical and chemical properties of the surfaces of the work and the tool in contact."

How effectively have measurements of these factors been translated into tests of forgeability?

Tied To Operations — Although the universally applicable test of forgeability has yet to be developed, progress has been made in determining certain forging characteristics of metals. To some extent, each of the known tests attempts to approximate one or more of the conditions encountered by the metal during the forging operation.

Some tests, for example, emphasize the role of compression. Others place major emphasis on tension, bend, twist, or impact. In a few instances, attempts have been made to incorporate a number of individual factors in a single test.

Hammer vs Press — These factors, taken singly or as a group, are a fair indication of the complexity of forgeability testing. But a further complication arises from the fact that while some tests may provide useful information for hammer forging applications, these same measurements may not be applicable to press forgings.

Alloys of aluminum, for example, readily lend themselves to press forging. In general, steels and stainless grades do not. In practice, most ferrous materials are hammer forged.

Either Way—Some insight into the principal differences between press and hammer operations is provided by A. L. Rustay, Technical Director, Wyman-Gordon Co., Worcester, Mass. This company, incidentally, is equipped to use either method.

Press forging of aluminum is a highly successful operation, according to Mr. Rustay. Why? Primarily because the temperature of the dies and the temperature of the aluminum can be maintained at about the same level throughout the forging operation.

"Let's assume that we determine the optimum forging temperature for an aluminum alloy to be somewhere around 800°F. It is relatively easy to heat our dies to this same

Compression tests rate high; but pending future refinements, a number of other types are being widely used.

temperature. This means that our aluminum will continue to maintain its optimum forging temperature throughout the forging operation.

Big Difference—"With steel, it's a very different story. We're dealing with an optimum forging temperature of about 1800° to 2000° F. Obviously, the dies cannot be heated to this temperature. And when a hot billet is placed in a relatively cold die, it loses heat rapidly."

This is certainly one of the main reasons for hammer forging steel. Because the hammer makes only momentary contact with the steel billet, heat losses to the hammer are far less.

Draper's forgeability survey stresses the importance of both temperature and speed in hot forging operations. In fact, he concludes that the "range of temperatures and speeds which can be used for a given alloy might be considered a fourth component of the term forgeability."

Compression Leads — Even the mere listing of these forging variables underlines the complexity of forgeability measurements. Nevertheless, forgeability tests have been developed and some are in daily use. To what extent are they successful? Are they dependable? What, specifically, are their limitations?

Compression tests seem to rate high with many forging experts. There is a very logical reason behind this preference. Although most compression tests are now being used to determine either flow stress or ductility, a "fully evaluated" compression test could supply answers to all three forgeability components (i.e. flow stress, ductility, friction coefficient.) This potential, alone, is enough to put compression testing a few cuts above the rest of the field.

Tension And Bend — Pending future refinement, even this advantage is largely relative. A number of other types of forgeability tests are still in the running. And, depending upon specific application, each has its particular virtue.

Tension testing at elevated temperatures still serves to provide useful data on the forging characteristics of both copper and aluminum alloys. A modified tension test, combining both tension and impact, is being used to measure the flow stress of aluminum and determine maximum forging temperature.

Bend tests are being used to some extent to determine the ductility of forging stock. The usefulness of these tests is limited by the fact that they do not provide conditions that are as drastic as those encountered in actual forging.

Some Others—Notch-bend tests (using V-notch impact specimens) give some measure of the range of hot shortness that occurs during the rolling or forging of some nonferrous alloys. Similar tests have also been used to evaluate the forging ductility of steels, aluminum, brasses, and magnesium as a function of temperature.

Hot-twist testing—or the torsion testing of bars at elevated temperatures—is another measure of flow stress and, to some extent, ductility. Some forge shops find this test to be a reliable standard. Others are of the opinion that because the tests are conducted at temperatures above and below the normal forging range, they are of limited practical value. For one thing, many alloys tested at temperatures above the normal forging range are likely to have very low cohesive strength due to incipient melting at the grain boundaries.

All-Around Test — These are some of the different types of forgeability tests developed to date. Most of them are limited in scope and usefulness. But taken cumulatively, are they of any help in developing an all-around test of forgeability?

Bearing in mind the three components of forgeability, Draper concludes that "compressing or upsetting a cylindrical blank . . . can supply both the flow stress of the metal and the frictional resistance at the interface.

"The force required to compress the blank by 30 to 50 pct comprises the simplest measure of flow stress. However, to obtain the upsetting force, a common or special press, instrumented for recording the forging force and the stroke, must be available."

Right Direction — The problem of determining friction requires more research. But, according to Draper, "two basic force values, one for a small reduction (20-50 pct) and the other for a large reduction (80-90 pct) are possibly sufficient. However, a set of force data for a number of reductions, or preferably a force-stroke curve, supplies more complete and accurate information from which it should be possible to derive the frictional conditions."

There still remains the problem of measuring ductility at forging temperature. For general applicability, neither upsetting nor bending tests are entirely satisfactory in the opinion of the experts.

Draper believes that "some test patterned after the bulging or expansion tests used to evaluate the ductility of plate, sheet, or tube (at room temperature) may offer a solution to this problem."

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Ceramic Coatings Raise Heat Resistance of Super-Alloys

By P. A. Huppert—Director, Ceramic Coating Dept., Gulton Industries, Inc., Metuchen, N. J.

Ceramics are staging a comeback as a means of protecting metals against heat corrosion.

New refractory materials and special fluxes make it possible to apply thin ceramic coatings that will even improve high-temperature properties of the super-alloys.

▪ Refractory ceramic coatings are coming into their own again, this time to protect the very materials which displaced them several years ago. Just as the super-alloys were able to cope with temperatures beyond the range of earlier refractory coatings, new ceramics can gird super-metals for further assaults on the heat barrier.

Ceramics available today offer heat-corrosion resistance in the 2000 to 2500°F range. Indications are they can be compounded to go a good bit higher. Temperature gradient (thermal drop) tests show they will insulate up to 140°F per mil (0.001 in.) of coating thickness. And they can be applied in extremely thin coats if desired.

No less important in Mach 4 flight are their other properties: Chemical resistance at elevated temperatures; good heat reflectivity or emissivity; surface hardness with improved erosion, abrasion and friction resistance at elevated temperatures; and resistance to vibration.

Coefficient of expansion can be adjusted to match that of the base metal, and extremely good chemical-mechanical bonds are obtained. Moreover, the chief drawbacks of older ceramic coatings—brittleness, low elasticity and low mechanical strength—have been greatly improved.

Boron Compound Looks Good—A number of super-refractory materials have been developed in recent years. One of the more promising of these is boron nitride. Pure boron nitride is a white powder consisting of microscopic platelets of hexagonal structure that can be pressed into a dense material of various shapes.

With the aid of extreme pressure and heat, General Electric Co. recently succeeded in experimentally converting the hexagonal BN structure into a cubic form. This modification is reported to be highly stable at elevated temperatures and to exhibit superior mechanical strength and great hardness. The conversion is analogous to the one of hexagonal graphite into the cubic diamond structure.

Boron nitride, like graphite, has excellent lubricating properties due to the flake-like structure of its particles; its chemical inertness extends over a wide temperature range. But its poor wettability, a desirable feature for shapes, is a handicap in making linings from powder.

Thin Films Possible — Physical, mechanical and electrical properties are listed in Table I. Boron nitride by itself is an ideal material for a number of applications in the aircraft and missile field. In the pure state, however, it has to be applied in rather heavy layers or as solid ceramic. Fortunately, this unique material can be incorporated in ceramic coatings, making use of its properties feasible in extremely thin films.

In order to use large amounts of BN or other super-refractory materials having high melting points in ceramic coatings, it's necessary to counteract their influence on firing conditions under which the coatings are applied.

This has to be done without impairing the strength of the base metal or causing warpage, without having to go to thicker metal, and without excessively increasing the weight of the coated system. At the same time it's desirable to use standard furnace equipment. The answer has been found in the form of powerful fluxing materials which, when properly incorporated in the ceramic coating, won't adversely affect the coating's performance.

Wide Choice of Fluxes — A number of potential fluxing agents are available. They include molybdenum trioxide, vanadium pentoxide, tungstic oxide, strontium oxide, barium oxide, and the long list of lithium compounds. While any one of these fluxes may be used by itself or in combination with others, lithia, especially in the form of chemically pre-compounded ceramic types, deserves preference. A wealth of experience has been gained with this material in recent years; it makes an outstanding fluxing agent and at the same time serves as a wetting agent at elevated temperatures.

Table II lists available lithium compounds and lithium salts. A summary of the most significant properties of lithium compounds in the so-called ceramic family is presented in Table III, and com-

TABLE I Properties of Boron Nitride

Density of pressed material gms/cc		2.1 to 2.15 (theoretical max. density 2.25)
Melting Point		2730°C = 5000°F approx.
Porosity		6 to 10 pct
Specific heat at	0°C	0.197
	1000°C	0.297
	1400°C	0.372

Linear Coefficient of Normal Expansion cm/cm° Cx10⁻⁶

Temp., °F	Direction 1	Direction 2
75 – 660	0.59	10.15
75 – 1300	0.89	8.06
75 – 1800	0.77	7.51

Thermal Conductivity, CGS Units

Temp. °F	Direction 1	Direction 2
570	0.0687	0.0362
1300	0.0646	0.0318
1800	0.0637	0.0295

Modulus of Rupture, psi at

	Direction 1	Direction 2
75° F	7280	15880
570° F	7030	15140
1300° F	1900	3840
1800° F	1080	2180

Modulus of Elasticity, psi at

	Direction 1	Direction 2
75° F	4.91	012.36
570° F	3.47	8.79
1300° F	0.51	1.54
1800° F		1.05

Tensile strength, psi at 20° C: 3000 to 3500

Dielectric Constant (baked and desiccated specimens)

Frequency cycles/sec	Dielectric Constant 75° F	660° F	900° F
10^2	4.15	4.4	9.0
10^4	4.15		4.5
10^6	4.15		4.25
10^8	4.15		

Dissipation Factor (baked and dessicated specimens)

Frequency cycles/sec	Dissipation Factor 75° F	660° F	900° F
10^2	0.00103	0.032	1.0
10^4	0.00042	0.0043	0.1
10^6	0.00020	0.0012	0.0056
10^8	0.000095	—	—
10^{10}	0.003	0.0004	0.0005

Resistivity vs temperature (dry specimens)

Temp., °F	Resistivity, ohm-cm
75	1.7×10^{13}
900	2.3×10^{10}
	3.1×10^{4}

Resistivity vs. humidity

Relative humidity, Pct	Resistivity at room temp., ohm-cm
20	1×10^{12}
50	7×10^{10}
90	5×10^{9}

Note: Measurements taken from compressed specimens are:
Direction 1, measured perpendicular to the forming pressure.
Direction 2, measured parallel to the forming pressure.

TABLE II Lithium Compounds Available

1. Lithium borosilicate
   Lithium chromate
   Lithium fluoride
2. Lithium molybdate
   Lithium silicate
   Lithium manganite
   Lithium carbonate
3. Lithium aluminate
   Lithium aluminosilicate
   Lithium cobaltite
   Lithium metaborate
   Lithium titanate
   Lithium zirconate
   Lithium zirconium silicate
4. Rare compounds, such as lithium cerate, lithium vanadate, lithium selenate.
5. New complex compounds in development stage, such as lithium borosilicates in varying compositions; barium and strontium combinations, lithium silico-fluorides, etc.
6. Standard lithium salts, such as lithium chloride, lithium sulfate, lithium hydroxide, lithium bromide, lithium nitrate, lithium nitrite, lithium amide.

positions of complex or multi-lithium compounds are given in Table IV.

Lithium fluoride is of principal interest; it acts as a double fluxing agent because it combines two powerful fluxing elements, lithium and fluorine. In second place is the newly developed lithium chromate; the chromium content helps to increase bonding action between the metal alloys and the ceramic coatings. The third material recommended is lithium borosilicate, one of the first complex lithium salts or so-called multi-lithium compounds to be recognized as superior constituents of glass. The fourth important compound is lithium silicate, which has been found to very favorably influence electrical properties.

Three Stages — Basically, the

TABLE III

Ceramic Lithium Compounds

Name	Formula	Mol. Weight	Li_2O, Pct	Color and Form	Soluble in Water	Melting Point
Lithium Aluminate	$LiAlO_2$	65.9	22.7	White powder	No	1625°C
Lithium Cobaltite	$LiCoO_2$	97.9	15.3	Dark blue powder	No	*
Lithium Manganite	Li_2MnO_3	116.8	25.6	Reddish brown powder	No	*
Lithium Metaborate	$LiBO_2.2H_2O$	85.76	17.4	White crystalline powder	Yes	840°C
Lithium Silicate	Li_2SiO_3	89.9	33.2	White powder	No	1210°C
Lithium Molybdate	Li_2MoO_4	173.8	17.2	White crystalline powder	Yes	705°C
Lithium Titanate	Li_2TiO_3	109.8	27.2	White powder	No	
Lithium Zirconate	Li_2ZrO_3	153.1	19.5	Creamy white powder	No	
Lithium Zirconium Silicate	$2Li_2O.ZrO_2.SiO_2$	243.0	24.6	White powder	No	
Lithium Carbonate	Li_2CO_3	73.89	40.4	White powder	Yes	735°C
Lithium Fluoride	LiF	25.94	57.6	Fluffy white powder	Minute	845°C

* No oxygen loss when heated to 950°-1000°C

(Data courtesy of Lithium Corp. of America)

newly developed ceramic coatings consist of three phases. Phase No. 1 is a standard high temperature refractory coating such as the Bureau of Standards No. A418; the "Solaramic" coating, commercially available as No. 5210-2C; or Chicago Vitreous' coating No. S113-290B. Phase No. 2 consists of adding boron nitride, and Phase No. 3 introduces a fluxing agent, preferably a lithium compound.

Practical application of these novel ceramic coatings doesn't differ from previous practices, except that coating thickness may be reduced considerably. Sometimes, however, more than one coat will be required; in these cases the base coat serves to promote adherence and heat-corrosion resistance, while the top coat is for chemical resistance and improved heat reflectivity or heat emissivity. If insulating properties are desired, several layers may be needed for adequate performance.

Most recent efforts have dealt with converting this three-phase system into a two-phase system by eliminating fully, or to a large extent, the additions of frits. This may be done by using complex lithium compounds of the glass-like type.

Many variations of these coatings are possible and numerous additional materials may be added.

Need Standard Tests — Particle size, thickness of application and firing cycles greatly influence properties of the coatings; they have to be closely watched, once optimum conditions are established by the usual trial-and-error method. Systematic investigations of all details of the processes involved are the present goal of the industry. A big obstacle still to be overcome is the fact that standardized testing equipment and testing methods are not yet available.

So far, in a rather qualitative manner, adherence may be tested by the bending method and the results classified by visual or microscopic examination. Thermal endurance combined with thermal shock may be tested by flame impingement. A modification of the flame impingement test serves for thermal-drop testing.

While much remains to be done, high-refractory ceramic coatings can be made and applied on the basis of current information.

TABLE IV

Examples of Complex Lithium Compounds

	#1250	395	397	399	401	403	405
Li_2O	24	5	5	5	5	5	5
B_2O_3	45	55	55	55	55	55	55
SiO_2	31	40	30	20	30	20	20
BaO	—	—	10	20	—	—	10
SrO	—	—	—	—	10	20	10

Acknowledgments

Portions of the tabular material presented herein are from The Ceramic Data Book, and from reports prepared by The Carborundum Co. and Massachusetts Institute of Technology. The author also wishes to express thanks to W. M. Fenton, Vice President, Lithium Corp. of America, and to J. H. Koenig, Director, School of Ceramics, Rutgers University, for their valuable assistance.

New Process Makes Nylon Coatings Possible

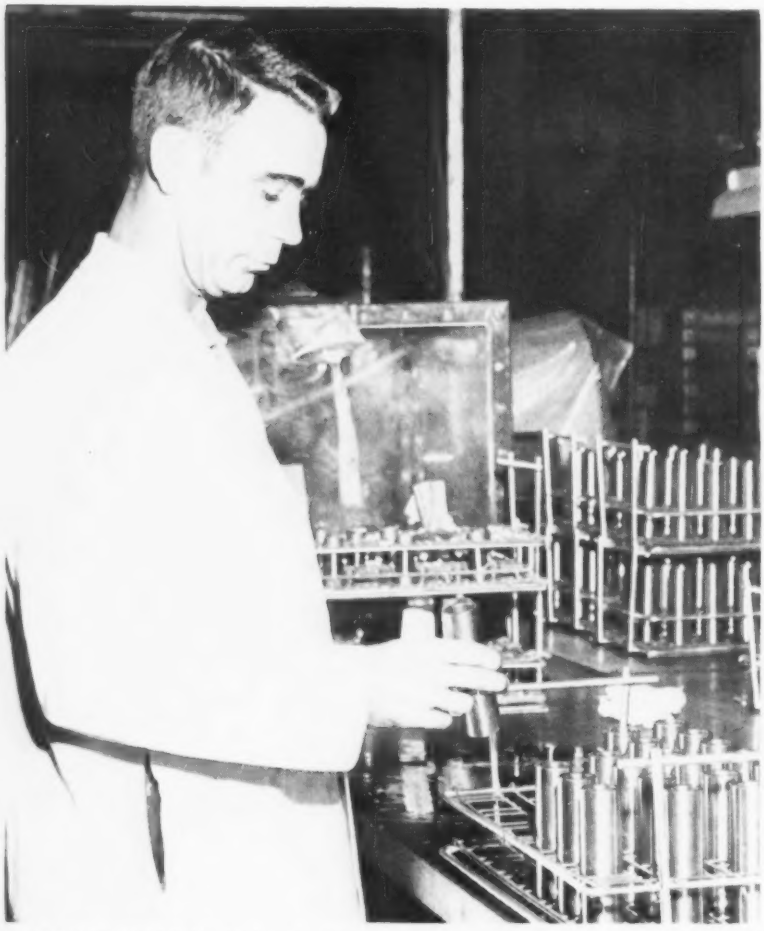
Few materials can lay claim to the kind of versatility inherent in nylon. Hardly a day goes by that you don't encounter this rugged plastic in one form or another.

And now, it's available for still another long list of applications: as a smooth, long wearing, high-impact and chemical resistant coating.

▪ Nylon can now be applied as a protective coating. A new process developed in Germany makes it possible to form smooth, flawless coatings of nylon and other plastics on metal, wood, glass or ceramics.

In place of the traditional forms of coating materials in solvent solutions, the patented process uses a fluidized bed of finely divided, specially prepared plastic powders. Objects to be coated are first preheated to a temperature above the melting point of the coating resins. The part is then immersed in the fluidized bed of powder, which is kept in suspension by a rising current of air that comes through a porous ceramic base plate. Degree of fluidization is controlled by varying air pressure and volume.

The article is then removed from the bed and cooled. In some cases, postheating may be necessary before the piece is cooled. The finished coating has a mirror smooth, pin-hole free surface with no bridging or runs.



RUGGED RACKS: Nylon coating on wire racks prevents marring and scratching of aircraft piston pins, resists degreasing solvents.

Builds Heavy Films—Thickness of coatings which can be deposited varies from 8 to 40 mils. It depends on the plastic powder being applied, the nature and thickness of the article to be coated, preheat temperature and immersion time. The last two factors are variable in any one application and are used to control thickness. Normally, close tolerances can be held. Where very exact tolerances or thinner coatings are desired, the coating can be machined or ground.

Objects to be coated must be able to withstand a minimum temperature of 600 F. Metals thinner than 0.025 in. can't be coated since they won't retain enough heat for proper flowing of the powdered resin.

The process permits custom coaters to apply both nylon and polyethylene in coating form. A wide range of other plastic resins can be used, including butyrates, epoxies and chlorinated polymers. The resultant coatings reflect, to a large extent, the basic mechanical, electrical and corrosion-resistant properties of the virgin resin itself, since no solvents, stablizers, extenders or other additives are needed.

Already in Use—An example of

the problems it'll solve recently presented itself at the Longueuil, Quebec, plant of Canadian Pratt & Whitney Aircraft Co., Ltd. Highly machined aircraft parts were being dropped from a height of 4 in. onto welded steel wire trays on a conveyor. This conveyor then carried the pieces through a degreasing chamber, where the parts were sprayed with trichloroethylene at temperatures up to 195°F.

The drop of 4 in. onto the metal tray caused scratching and marring of the machined surfaces. Conditions in the operating area made the trays rust and corrode, and these contaminants soiled the parts. It was decided to apply a coating that would both protect the parts from surface damage and prevent corrosion of the trays themselves.

Trays were first dip-coated with a vinyl plastisol. Although the coating temporarily stopped scratching, it couldn't withstand exposure to 195°F and attack by the trichloroethylene degreasing agent.

Solved With Nylon—The problem was finally solved by Atlas Mineral Products Co., Mertztown, Pa., a custom-coater licensed to use the new German process in this country. The impact resistance and natural lubrication qualities of nylon eliminated marring and scratching of the parts. Nylon also withstands the high temperature, and is completely unaffected by trichloroethylene.

The deciding factor, however, was the fact that nylon could at last be applied in coating form; without this new development the material couldn't have been used. The fluidized powder process proved an ideal means of coating the complicated wire units, depositing a protective film over the entire surface with no bridging or running. A costly maintenance problem was thus eliminated.

The wire trays are coated in five steps, with a complete cycle of 4½ minutes. First, parts are dipped in and out of a bath of trichloroethylene, the only surface preparation required. The pieces are then wired individually with thin wire not exceeding 20 mils. Thin wire won't retain heat and therefore doesn't become coated. Groups of four trays are then placed on special racks and preheated in an oven at 900°F for four minutes. Immediately upon removal from the oven, the parts are dipped into the bed of fluidized nylon powders.

PREHEAT FOR COATING: Parts to be coated with nylon are first heated to a temperature of 900°F, higher than the resin's melting point.

DIP-COAT IN POWDER: Nylon coating starts as a powder, fluidized by an ascending current of air passing through a porous baseplate.

Actual dipping requires care. A different technique for dipping and movement in the coating powders must be used for different sizes and shapes of parts being coated. Dipping gives the trays a film of 9 to 10 mils. On removal from the coating powders, trays are immediately quenched to prevent oxidation of the steel and assure good adhesion of the nylon film.

Tips on Welding Thick-Walled

More and more, the process industries are calling for bigger vessels that'll withstand higher temperatures, pressures and corrosives.

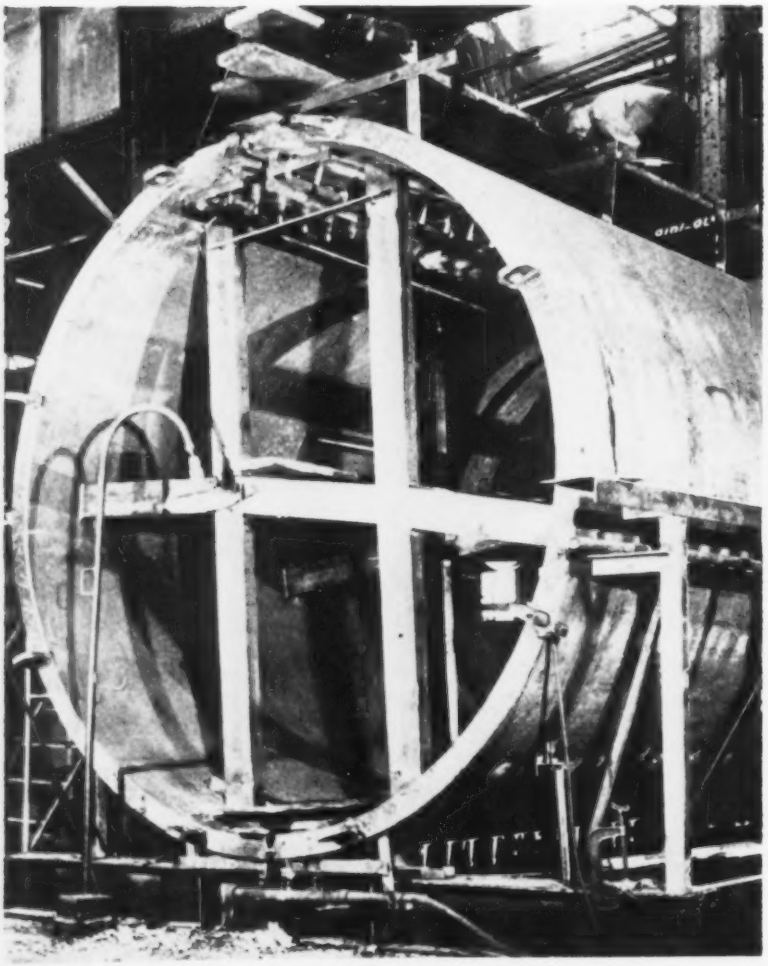
Fabrication of such units requires a great deal of care to assure sound welds. Here's how one company goes about working with extra-heavy plate.

■ Take thirteen different kinds of steel, some of it more than 5 in. thick. Weld it into two identical vessels 12 ft in diam and 20 ft long, each weighing almost 100 tons. Keep in mind that the vessels will be operated at nearly 1000°F in a hydrogen-rich atmosphere under pressures of almost 600 psi. Verify by X-ray inspection that all welds are at least 95 pct efficient. Stress-relieve the completed vessels at 1100°F and test them hydrostatically at 1500 psi.

It all adds up to a tough welding job, one that takes real ingenuity to do efficiently and profitably.

The Eddystone Div., Baldwin-Lima-Hamilton Corp., did such a job recently for C. F. Braun & Co., refinery constructors of Alhambra Calif.

It entailed making a pair of reactors for catalytic reforming at Tidewater Oil Company's new refinery near Wilmington, Del. They serve as reaction chambers in which paraffins and naphthenes are converted to high octane gasoline.



KING-SIZE CYLINDER: Automatic welder makes 64 passes to complete longitudinal joint in 5-in. thick plate. Vessel body is rotated to alternately weld opposite sides of the joint and cancel stresses.

Requires Alloy Steel—The vessels were fabricated in two half-cylinders 12 ft long and 12 ft in diam. They were made of chrome-moly steel 5 1/16 inches thick, joined to hemispherical heads at top and bottom made of the same material 2⅝ in. thick. Ends of the cylinder walls were tapered from the outside so that, at the joint, the walls and heads were of the same thickness.

In all, 13 analyses of base metal were used in the vessels, and 9 different kinds of filler metal were needed to match their physical and metallurgical properties. Welding wire and electrodes supplied by Alloy Rods Co., York, Pa., were used.

Make Two At Once — The two vessels were fabricated simultaneously. This was done to minimize setup time and reduce X-ray inspection costs.

Starting with the half-cylinders, material was carefully preheated before joint profiles were formed by flame cutting.

Assembly of the big vessels began by placing one half-cylinder, open side up, on the shop floor. With a 150-ton overhead crane, the other half was positioned so that mating edges lined up closely. Next, temporary brackets were welded to the cylinder sections.

Gas pipes with jets on 6-in. centers were placed above and

Vessels

below each seam and the base metal was preheated to the specified interpass temperature range of 350° to 400°F. A close check was kept on the temperature throughout the welding work.

Rotate to Weld Flat—With seams horizontal, tack-welding was done by manual shielded arc. Then, the cylinder was rotated so the longitudinal seams were at top and bottom. This permitted automatic submerged arc welding machines to weld on the flat.

All machine welding on the pressure vessels was done with Drawalloy 1.25 Cr, 0.5 Mo filler wire and Linde flux Grade 80, 20 x 200.

Joint design for the longitudinal welds called for 64 passes to be built up in a balanced manner, first on one side of the cylinder wall and then on the other, to avoid uneven stresses. The first 6 passes were deposited on the outside of the top seam. The cylinder was then rotated until that seam was at the bottom.

Tack welds were removed by back-chipping and grinding to the base metal. Then automatic submerged arc welding on the inside of the seam was completed through the 24th pass. The cylinder was again rotated. The next 25 passes were put down on the outside of the vessel wall. After this, the cylinder was turned for the last time and the final 15 passes were made.

Twice As Fast—Simultaneously, the same procedure was followed on the opposite seam so that while welds were made on the outside of the cylinder wall, a second automatic welding machine was making welds on the inside.

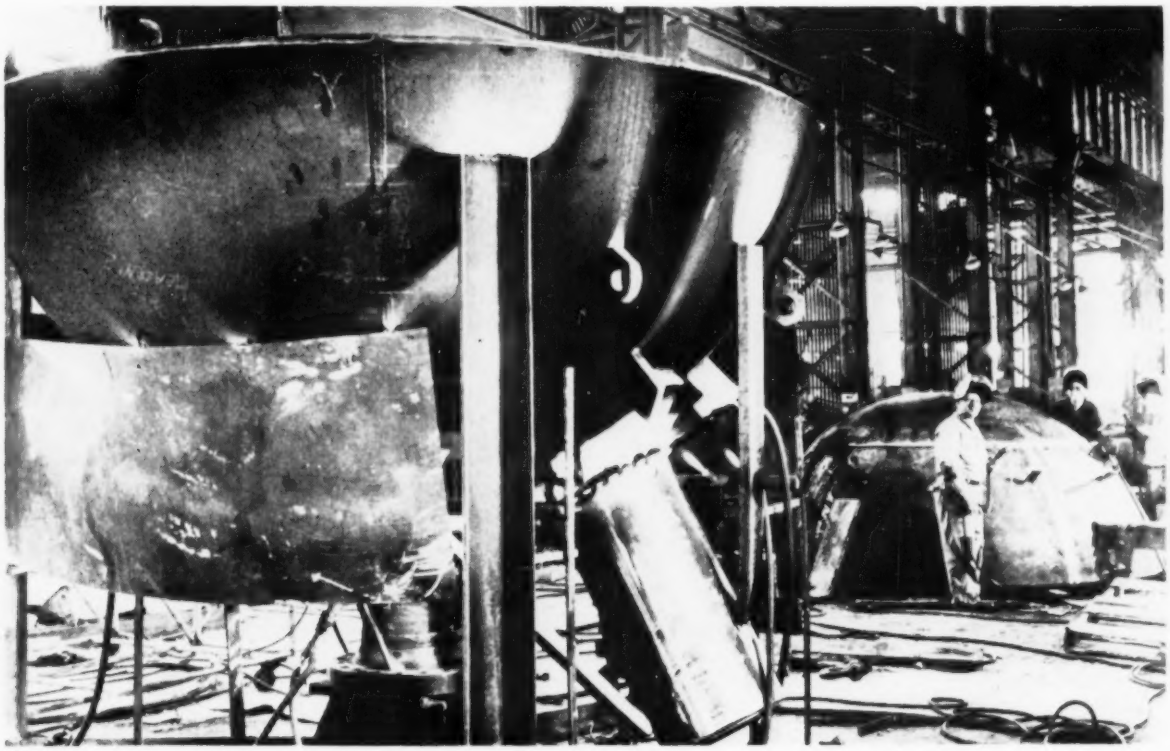
The first 8 passes on each of these longitudinal seams were made with 5/32-in. diam wire at 375 to 450 amp, with a travel speed of 18 to 22 ipm. The remaining 56 passes were made with 3/16-in. wire at 550-650 amp with a travel speed of 10 to 12 ipm.

After the two longitudinal seams were completed and before heads were added, the cylinder was stress-relieved and radiographed. Joints and taper of the walls were then machined.

Six-Piece Head—While the vessel walls were being welded, heads were fabricated as subassemblies. Each vessel has two heads consisting of five orange-peel sections and one dish-shaped section to form a hemisphere approximately 11½ ft ID at the open end and about 4½ ft deep.

Throughout welding, a preheat and interpass temperature of 350°F was maintained. Filler metal for the hemispherical head sections was AWS Class E-8016-B2.

Sectional seams were welded by manual shielded metal arc. Each joint required 48 passes. The first 11 passes were made with 3/16-in. diam wire at 190 to 250 amp and



MADE SEPARATELY: Hemispherical heads are fabricated as subassemblies at Baldwin-Lima-Hamilton shops and then welded to the cylinder. Joint between head and 20-in. nozzle at center required 92 passes.

the remainder with ¼-in. wire at 300 to 450 amp.

Nozzles Are Tricky — Attached to the bottom head were two nozzles, one 20 in. and the other 8½ in. in diam. Three nozzles were attached to the top head: the first 18 in., the second 20 in. and a third 3½ in. in diam. To strengthen junctures between pipe nozzles and heads, reinforcing plates, or saddles, were welded to the outside of the heads.

The joint between the bottom head and the 20-in. nozzle required 92 passes. This was a single-bevel joint with a 1-in. root opening. By using the saddle as a backing plate, the head, reinforcing plate and pipe were joined into an integral unit. Electrodes ¼ in. in diameter were used at 300 to 450 amp. The welding process was manual shielded metal arc.

After the nozzles were in place, the outsides of the reinforcing plates were fillet-welded to the pipe; this completely sealed the joint.

Heads were then stress-relieved and radiographed. Edges that would be butt-welded to the cylindrical vessels were machined to provide a uniform fit.

For Pipe-to-Pipe Welds — In fabricating the heads, some pipe-to-pipe welding was necessary. This was done by Heliarc.

The first pass was made with a thoriated tungsten electrode 3/32 in. in diam, but no filler metal. A second pass was made with thoriated tungsten electrode, plus 1.25 Cr, 0.5 Mo Drawalloy wire 3/32 in. in diam. Heliarc welding on the first two passes eliminated the need for costly and time-consuming backing rings. The remaining three passes were made by manual shielded metal arc, using AWS Class E-8016-B2 Atom Arc 8016 CM electrodes 3/16 in. in diam at 190 to 250 amp.

For joining cylinders and heads, the vessel bodies were placed on a set of 150-ton capacity Worthington drive-rolls. A backing strip for the single U-groove between cylinder and head was applied to the inside of the cylinder. This backing ring served also as a means of aligning and guiding the heads into position. As the heads were swung into position, they were temporarily braced and tack-welded to the cylinder.

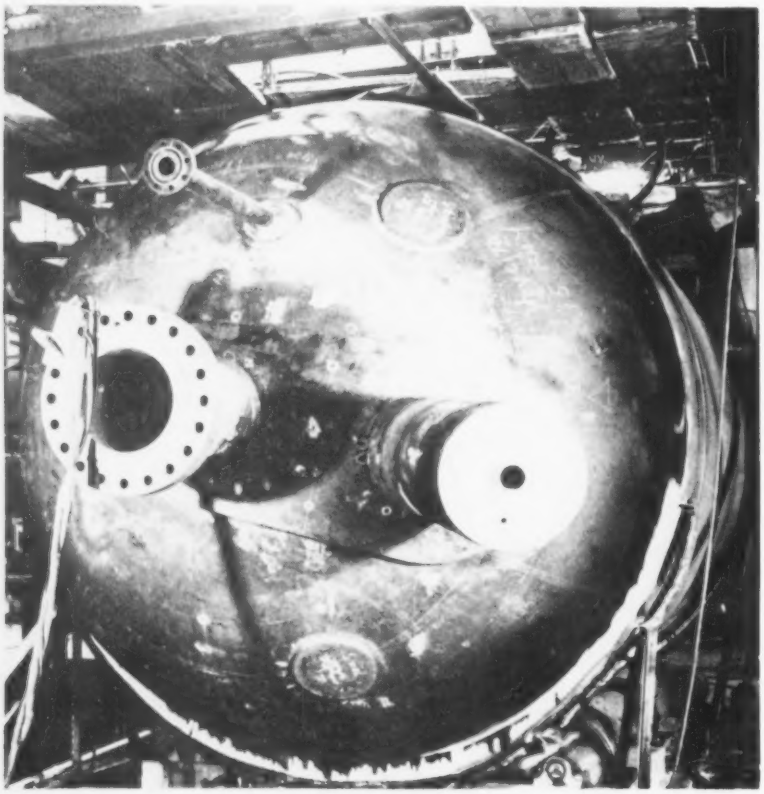
Gas jets for preheating metal on either side of the joint were mounted around the circumference. An automatic submerged arc welding unit was placed on a scaffold above the vessel. Then, as the vessel was brought to preheat temperature it was slowly rotated by the drive rolls and the 37-pass weld was completed.

The first pass around the circumference was made with 5/32 in. wire at 450 to 500 amp with a travel speed of 14 to 16 ipm. The balance of the passes were made with 3/16 in. wire at 550 to 650 amp with a travel speed of 10 to 12 ipm.

Thorough Inspection—All root passes, all joints that were back-chipped, and all completed welds were examined by magnetic particle inspection. Also, all welds in the piping and vessels were given 100 pct radiographic inspection with 1-curie sources of cobalt-60.

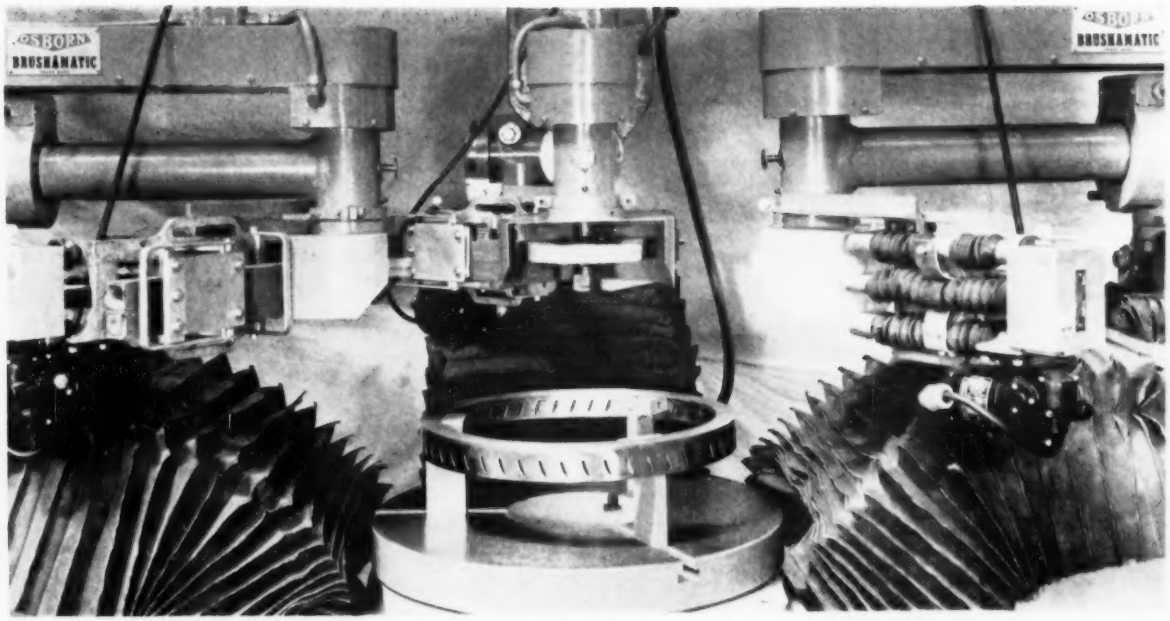
Completed vessels were placed on a flat-car and moved into a stress-relieving furnace. The furnace has an inside length of 54 ft, is 15 ft wide and 18 ft high. A series of baffles distribute heated air so an even temperature is obtained at all points within the furnace. With the vessels inside, the temperature was brought to 1150 F and maintained for 24 hours.

Following stress relieving, the vessels were hydrostatically tested at 1575 psi. Pressure was maintained for three hours and all seams were examined for leaks. None were noted. Then—and only then—was the welding job complete.



AUTOMATIC SETUP: Head is welded to body on 150-ton drive rolls that rotate the cylinder at the proper welding speed. Automatic machine on upper platform welds the circumferential joint in 37 passes.

Powdered Metal Tool Bodies



BRUSHING CAPACITY: Three "L" heads coordinate with work table to put high quality finish on large parts.

Machine Brushing Strengthens Large Parts

How do you insure high strength - to - weight ratio for large precision parts in high-powered jet aircraft?

One factor is quality finish. But being so big, such parts have usually been hand finished.

It's a welcome addition to find an automatic brushing unit designed especially to handle the large parts.

■ While it's common practice to finish regular-sized precision parts with power brushes, it takes a unit with sufficient capacity to do the job on larger parts. Such a unit is the Brushamatic Model No. 51, an automatic brushing machine developed by the Osborn Mfg. Co., Cleveland.

The machine finishes parts weighing from 40 to 3500 lb. Two different types of interchangeable brushing heads, "L" and "O," work in conjunction with a rotating vertical-spindle work table.

Heads Determine Capacity—The type of head determines the maximum diameter of parts. Whenever the "L" type head is used, it's limited to 48 in., because the head is attached directly to the work table.

With "O" heads alone, there is no definite limitation on diameter of part. Being independent of the work table, the heads can be moved to any position. The limiting factor is the 3500-lb capacity of the work table.

A manufacturer of jet engines, using the Brushamatic, finishes 37½-in. diam gears at 20 per hour. Manually, a trained operator takes an hour to finish two. Even these don't meet the standards of the machine brushed gears.

Finish Effects Strength—Investigators have found that a sharp corner or edge may cut the endurance limits of a part by as much as 60 pct. Brushing can effectively reduce the concentration of stresses.

The flexible nature of properly specified brushes blends tool and grinding marks that are so much the source of potential cracks. While removing burrs, the brushes produce a smooth finish and well-rounded edges to blend joining surfaces.

The fineness of finish is determined by the type of brush and auxiliary compound used. The action of brushing is that of blending irregularities rather than removing metal.

Surface analyzer readings may show surface roughness of 24 to 35 microinches. Brushing can bring the surface down to a finish of 4 to 7 microinches.

powdered metal cutter body has a 45° corner angle, and there are 12

Powdered Metal Tool Bodies Boost Machining Efficiency

By Horace Frommelt—Director, Spring Garden Institute, Philadelphia

Vibration is rough on cutting tools, especially the somewhat brittle-edged carbides and oxides.

But by supporting these elements in powdered metal bodies, vibration at their cutting edges can be lowered markedly.

This means faster machining, with better finishes and improved tool life.

▪ Vibration in machining operations is the deadliest enemy of such hard cutting elements as carbides and oxides. The oscillations that damage the cutting edges of these tools can come from a number of sources: The machine tool itself, the workpiece, the holding device or the method of machining.

One way to restrict or dampen these vibrations is to use a powdered metal backing behind the cutting element. Pressed metal powder, such as iron, has about three times more resistance to yielding under pressure than cast steel. Put another way, the powdered metal's tendency to vibrate is about one-third that of steel.

Rigid Cutting Edge—When vibration can be reduced this much it means that the cutting edge of a tool will stay in the cut more firmly. The benefits show up as longer tool life, better workpiece finish, higher cutting rates and less power consumed per unit of metal removed.

Fig. 1 shows a milling operation on SAE 1020 steel. The 3-in. diam.

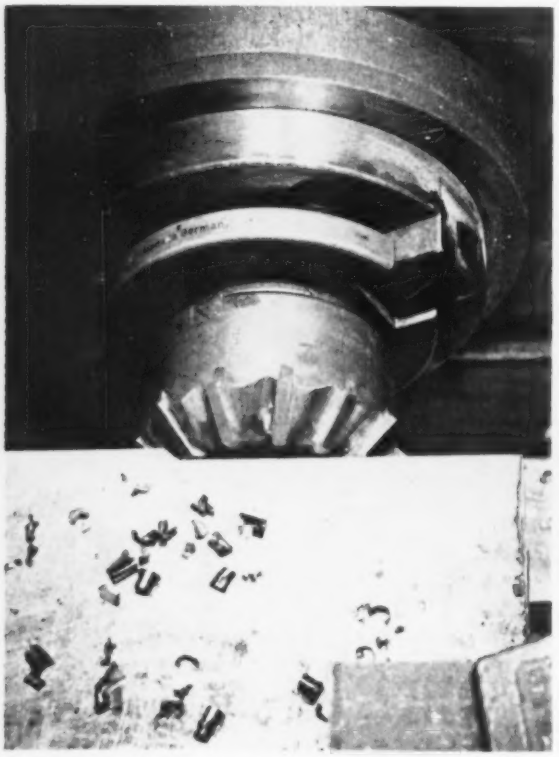


FIG. 1: Powdered metal body of face milling cutter has 12 carbide segments firmly locked in, cuts 22 cu in. per minute on SAE 1020.

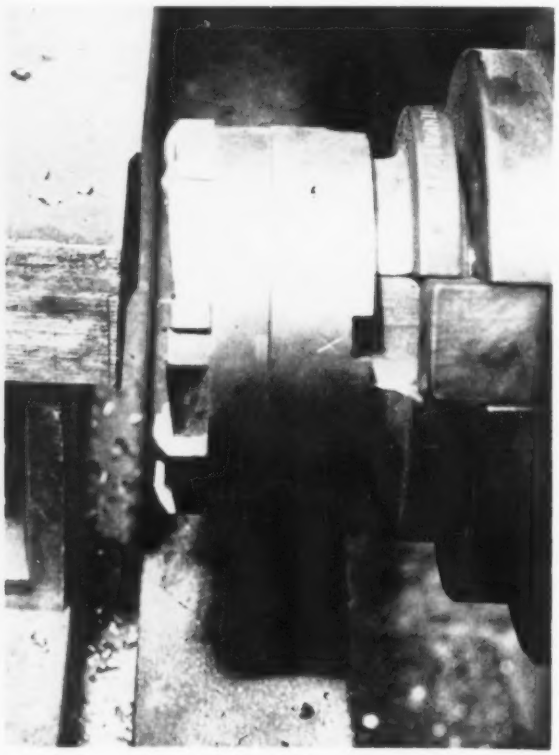


FIG. 2: Ceramic tool elements resist edge chipping when mounted in this powdered metal face mill body to machine SAE 1020.

powdered metal cutter body has a 45° corner angle, and there are 12 steel-cutting carbide segments.

The cutting segments are locked firmly in place by a process which impregnates the powdered iron voids with copper. This is not a brazing operation, however. The blade cavities are literally shrunk around the cutting elements to lock them in place.

Triples Tool Life—The milling operation shown was performed at 650 sfpm, 25 pct faster than the job was run previously with a conventional wedged-blade cutter. At this higher speed, also, the new cutter stayed on the job three times longer than the tool formerly used.

The feed rate for this operation was 2 ipm. Actual chip thickness, because of the 45° corner angle, was approximately 0.005 in. Power input from the milling machine motor was 15 hp, with a calculated 7.5 hp delivered at the cutter.

Thus the metal removal rate was about 22 cu in. per minute, or approximately 3 cu in. of material milled per horsepower available at the cutting edges. This represented a 200-pct increase in removal rate compared to former practice.

Trials of the powdered-body milling cutter at 1200 sfpm produced excellent results, also.

Sound Economics — The same cutter, with no change in tool geometry, has been used to mill hardened (58 Rc) SAE 4340 steel. In terms of tool life weighed against the metal removal rate, the practice seems to be economically sound for the practical machine shop.

Other types of wedged-blade cutters failed on this operation. Vibrations of the carbide blades set in steel cutter bodies actually pounded the 4340 chips into the cutting edges.

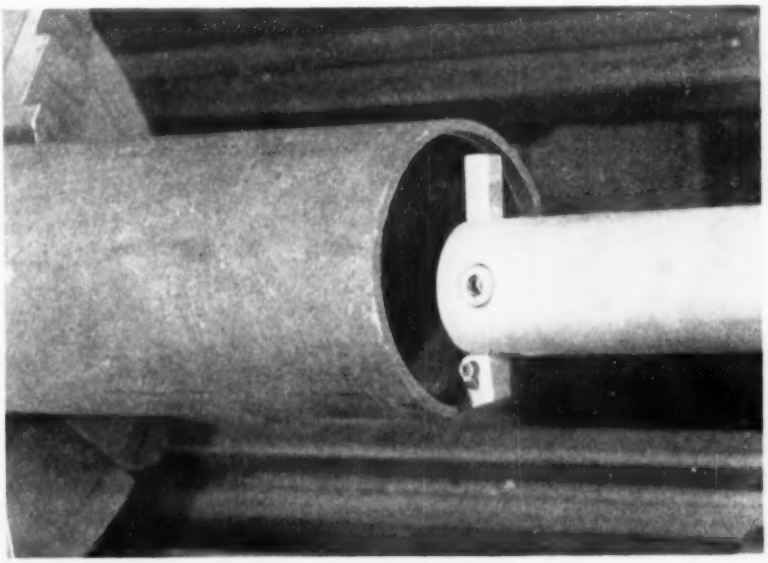
These chips became heated to the point of incandescence and welded themselves to either the cutter body or the carbide components. Welding was severe enough to cause the blades to shatter and the 50-hp milling machine to stall.

Ceramics Pass Test—Oxide cutting elements locked firmly in powdered metal cutter bodies have also milled cast iron and SAE 1020 steel successfully. Fig. 2 shows the steel milling operation, performed with a 4-in. diam face mill and eight oxide elements securely mounted in the powdered metal body.

Although these machining tests indicate that pressed iron powder, because of its high modulus of elasticity, has a superior vibration dampening effect, final confirmation comes from prolonged studies with vibration meters, strain gages and recordings of power consumed during metal cutting operations.

Carbide and ceramic tool geometry is important for efficient metal cutting, of course. But it seems that proper vibration dampening of these hard elements is the most important factor to be reckoned with.

FIGURES DON'T LIE: Vibration meter checks for inherent vibration in a lathe before tests are run on powdered metal tool supports.



FOR BORING: Solid carbide boring bar dampens vibration to permit faster, more accurate machining. (Kennametal, Inc., photo)

Handling Unit Speeds Blast-Cleaning Cycle

To get the most out of a blast-cleaner where forgings are cleaned in bulk, the handling system must match the efficiency of automation.

It's a step ahead to have the work load indexed in tote boxes.

A further step is to have the load dumped, cleaned, and returned to boxes, all without manual aid.

▪ Automatic blast cleaning has been teamed with a high-speed loading cycle and high-efficiency abrasive to increase production. It's a combination that gives better quality at lower cost for foundries, forge shops, and other metalworking plants that clean and descale parts in volume.

Such is the case at the Atlas Drop Forge Co., Lansing, Mich. A combination unit cleans forgings twice as fast as previously with no increase in time or labor. The amount of material handling for steel and titanium forgings, from ½ to 300 lb each, has dropped 60 pct.

One Does Work of Three—The company formerly used three units: a monorail blast room, a 17½-cu ft batch barrel, and an 8-ft Rotoblast table. Now, a 27-cu ft Pangborn Blastmaster barrel with an automatic loading unit cleans most of the work load. The new installation cleans large forgings previously handled only by the monorail room.

By using an indexing track, the loading device, designed by Pangborn Corp., Hagerstown, Md., advances tote boxes of forgings through three stations.

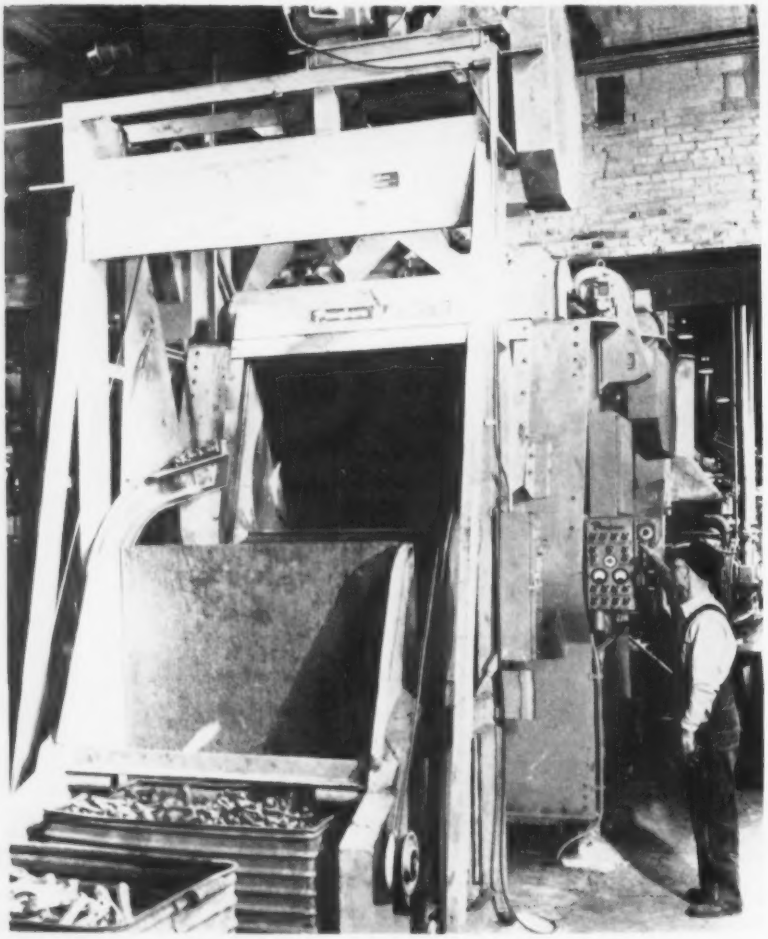
As the first tote box advances to the work-loading unit, the loader seizes the box firmly and picks it up to discharge the load in the work chamber of the barrel. The empty tote box passes through to await the cleaned load of forgings.

Single Operator—In addition to transferring the tote boxes, the fork-truck operator also controls the automatic blasting cycle from a signal panel.

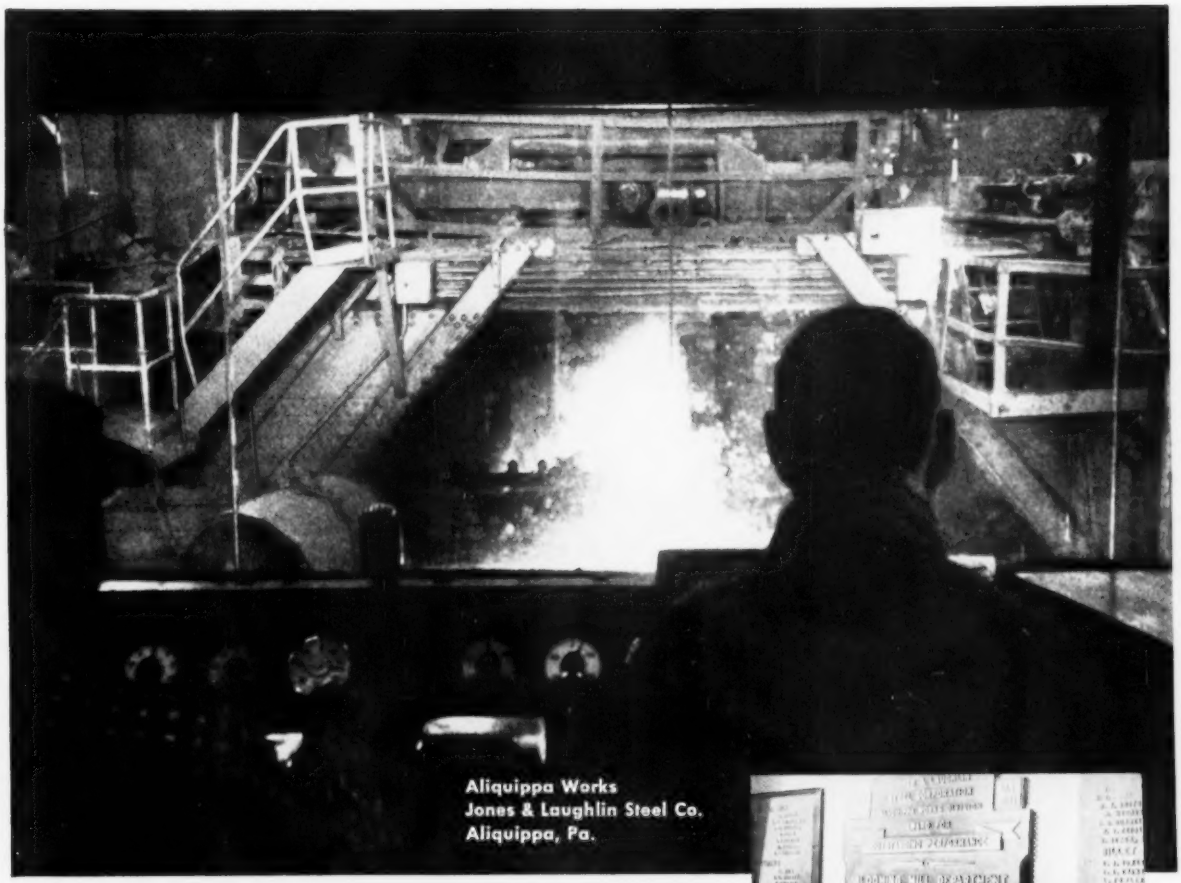
Two Rotoblast wheels, instead of the one found in most blast-cleaning barrels, give complete cleaning coverage. This means faster cleaning in less time.

Despite the larger abrasive handling capacity, tight door construction keeps abrasive costs at a minimum. In addition a secondary cycle tumbles the parts after the blasting cycle to remove abrasive from deep pockets.

The tumbling cycle prevents excessive carryout of abrasive when the work leaves the blast chamber and is returned to the tote box.



LOADER CUTS HANDLING: Operator starts cleaning cycle. Work-loading unit picks up tote box to empty parts into barrel.



Aliquippa Works
Jones & Laughlin Steel Co.
Aliquippa, Pa.

An ingot a minute!

and never a lubrication failure with Cities Service EP-21 Lubricant!

At Jones & Laughlin's Aliquippa Blooming Mill, they believe in production with a capital "P"!

Not only does J&L's Aliquippa Mill hold the world's record for ingots rolled in an eight hour turn (576), but they've set a year-in, year-out average of an ingot per minute!

How do they sustain this production for such long periods?

One answer lies in their modern, 44-inch, two-high reversing unit, powered by four 3000 h. p. motors arranged in tandem twin drive.

Another can be found in their lubricant . . . Cities Service EP-21.

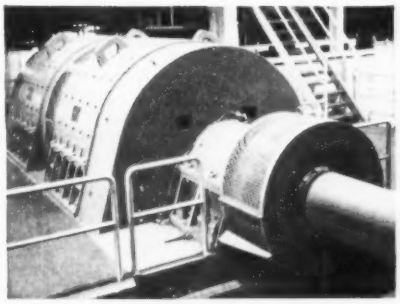
Used on main bearings, manipulator slides and window liners, Cities Service EP-21 and its superior additives provide an unusually tough film . . . tough enough to stand the highest pressures, the greatest shock loads with no loss of lubrication, no danger of rust or corrosion.

Yes, Jones & Laughlin is pleased with Cities Service lubricants! You'll feel the same when Cities Service goes to work in your operation. Talk with your Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

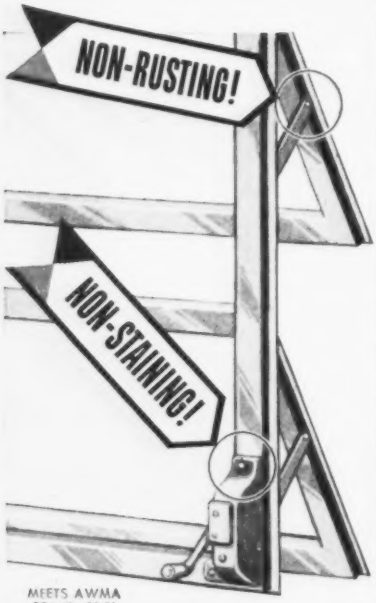
QUALITY PETROLEUM PRODUCTS

Award for 8-Hour Turn Record is displayed proudly outside mill. J&L smashed previous record by 38 ingots—rolled up new total of 576! Year-in and year-out, the plant averages an ingot a minute, with flawless lubrication provided by Cities Service.



Four 3000 h.p. Motors power the blooming mill at J&L's Aliquippa Works. These are 70 to 140 rpm, double-armature units arranged in tandem twin drive. At 70 rpm, they can reverse in under a second. Equally flexible is the mill's lubricant—Cities Service EP-21.

How Alcoa Aluminum Fasteners make good windows even better



MEETS AWMA STANDARDS!

You can meet the highest standards of quality and the specifications of the AWMA (Aluminum Window Manufacturers Association) for prime windows of aluminum when you assemble with Alcoa® Aluminum Fasteners. Perfect color match and protection against both galvanic and atmospheric corrosion make for lasting good looks . . . consumer satisfaction. Complete stocks carried by your local Alcoa distributor fill every requirement. He is listed in the Yellow Pages of your telephone directory.

ALCOA ALUMINUM FASTENERS
ALCOA

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NEW! "ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings

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Aluminum Company of America
2743-L Alcoa Bldg., Pittsburgh 19, Pa.

Gentlemen: Please send complete specification data and samples of Alcoa Aluminum Fasteners.

Name

Title

Company

Address

FREE TECHNICAL LITERATURE

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 175.

Conveyors

Engineered conveying systems are outlined in a data sheet. These include a hinged steel, apron type setup for automatic removal of chips, turnings and other scrap from high production machinery. (The Alvey-Ferguson Co.)

For free copy circle No. 1 on postcard, p. 175

Tool Room Grinding

Tool room grinding of alloy, high-speed and die steels is the subject of a 24-page brochure. Designed as a grinding source book for tool room men, it covers 22 areas in the field with short, factual copy. (Bonded Abrasives Div., The Carborundum Co.)

For free copy circle No. 2 on postcard, p. 175

Grinding Wheels

One company's grinding wheels are listed in a 4-page bulletin. A handy specification table lists thicknesses and bore of each wheel in stock. Standard diameters range from 12 to 36 in. It also includes some grinding hints and tips. (Simonds Worden White Co.)

For free copy circle No. 3 on postcard, p. 175

High-VacuumEquipment

A pair of well illustrated booklets cover: (1) high vacuum gages, (2) high vacuum valves, baffles and traps. (Rochester Div., Consolidated Electrodynamics Corp.)

For free copy circle No. 4 on postcard, p. 175

V-belt Drives

A comprehensive, 108-page manual is designed to assist engineers with power transmission problems. Indexed sections of descriptive material are profusely illustrated with product and installation photos. Engineering drawings and exploded views illustrate technical sections, which also contain selection tables for pre-engineered drives. (Dodge Mfg. Corp.)

For free copy circle No. 5 on postcard, p. 175

Steel Tubing

Seamless and electrical-resistance welded forms of steel tubing are described in a new general catalog. Full information is presented on carbon and alloy steel seamless tubing in mechanical, aircraft mechanical, airframe quality and pressure grades. Electric-resistance welded carbon steel tubing is covered in both mechanical and pressure grades. Another section involves special shapes. (Ohio Seamless Tube Div.)

For free copy circle No. 6 on postcard, p. 175

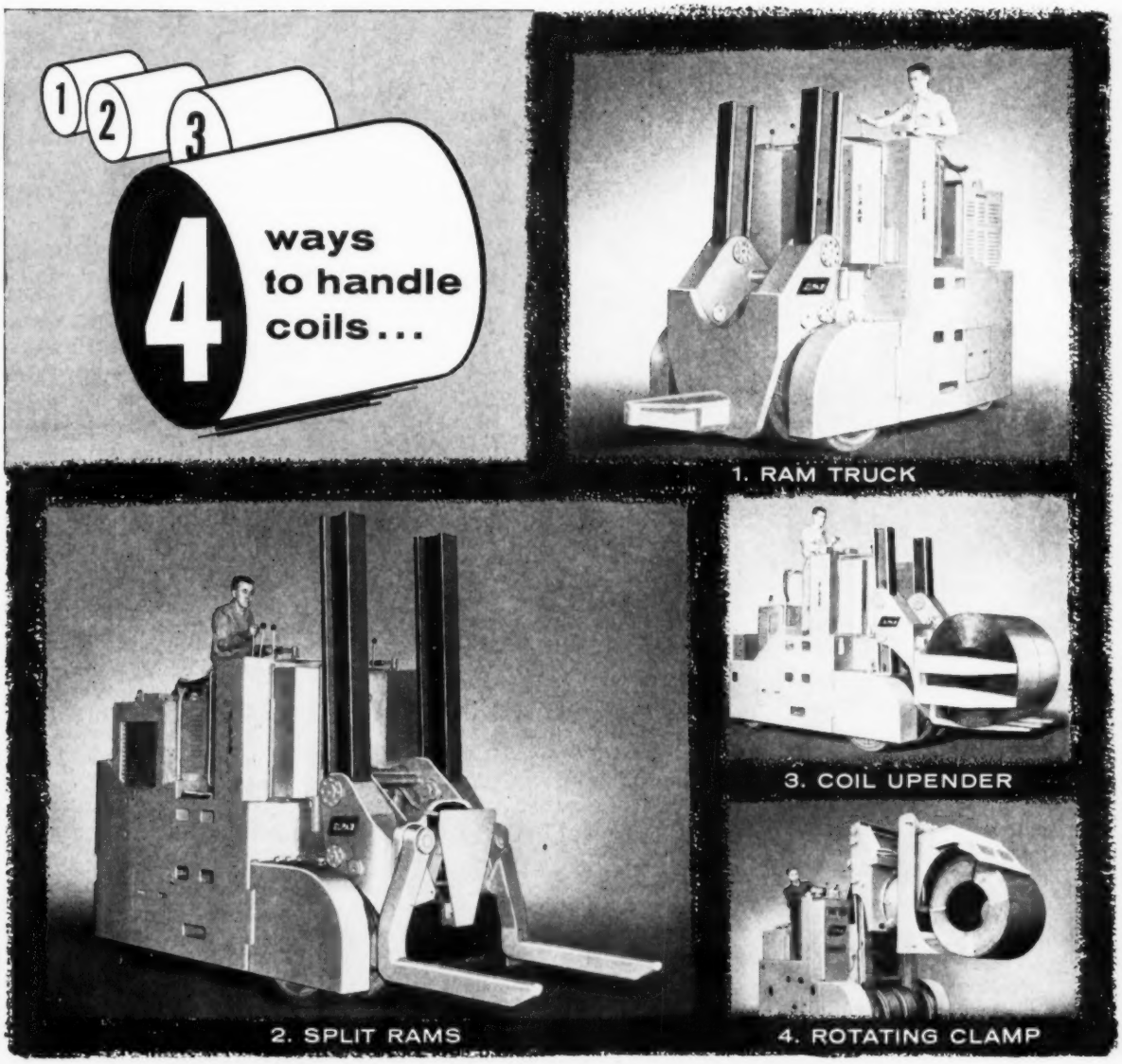
Miniature Bearings

A new edition of a catalog covering miniature bearings has been published. (Miniature Precision Bearings, Inc.)

For free copy circle No. 7 on postcard, p. 175

Color Selector Chart

By referring to a new color selector chart, you can select the desired



4 Reasons Why ELPAR Remains Top Choice in Steel Trucks

1. ELPAR RAM TRUCKS—"Old Reliable" with more new features. Dual drive motors, picture-window vision, power hydraulic brakes, dual controls, power steer—these are a few of the plus values that make ELPAR heavy-duty ram trucks the most efficient ever built. Continual design improvement keeps them the standard for the industry.

2. SPLIT RAMS—double-duty coil handling. Handle twice as many coils in the same time. Hydraulically-operated rams can be spread to handle two coils abreast . . . or brought together for single-ram-truck operation.

3. UPENDER—quick coil turnover. ELPAR truck with rotating forks upends and down-ends multi-ton coils with effortless ease. It speeds production operations and eliminates the need for stationary upenders.

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Benefit from Elwell-Parker's 50 years of steel industry experience. Learn how ELPAR trucks and attachments can cut your multi-ton loads down to manageable size . . .

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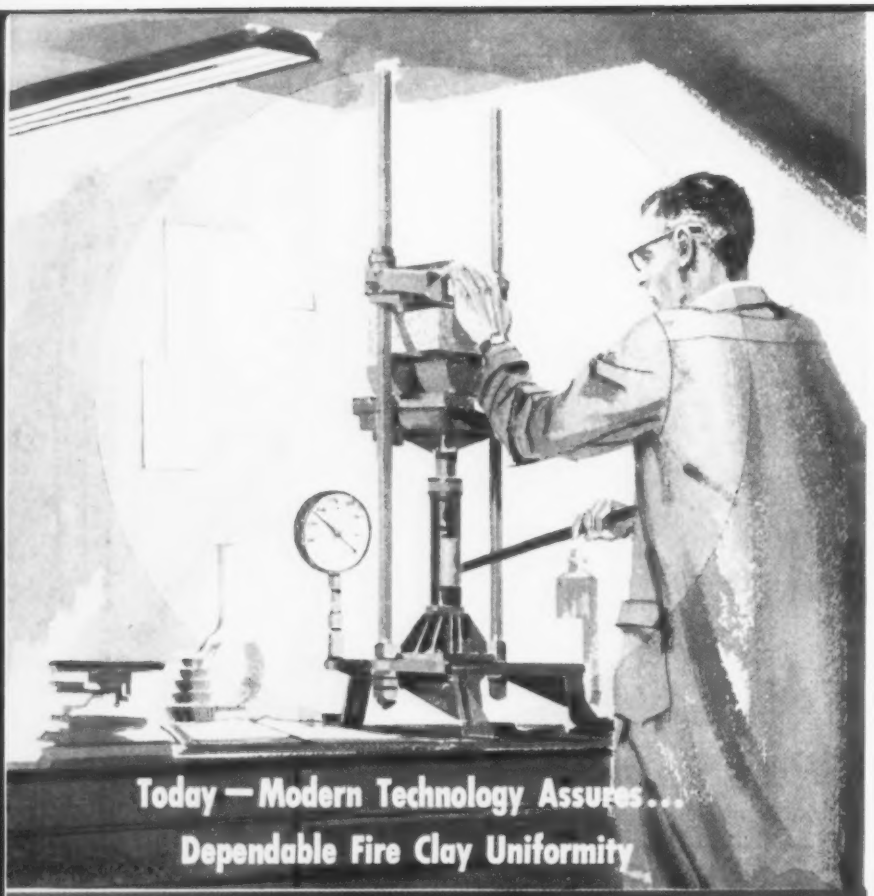

Illinois Clay Products Company's continuous quality control testing at each step of manufacture assures uniformity of physical properties and dimensional characteristics of refractory materials. This research and development pays off in impressive cost reductions and metallurgical results for industry.

Illinois Clay Products Company has excellent production facilities and a convenient location. Fast, dependable service can be made by truck or rail in a matter of hours. Write for information on your refractory requirements.

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GOOSE LAKE Ground Fire Clay, Fire Clay Flour, Grundite Bond Clay, Fire Clay Brick, Firox;

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CHEM-BRIX, Silica, Carbon.

ILLINOIS CLAY PRODUCTS CO.

FREE LITERATURE

color in a line of asbestos-protected metal roofing and siding. (American Steel Band Co.)

For free copy circle No. 8 on postcard, p. 175

Roll Pointing Machines

Both pedestal and bench type pointers for pointing non-ferrous wire and rod are illustrated in a new bulletin. (The Waterbury Farrel Foundry & Machine Co.)

For free copy circle No. 9 on postcard, p. 175

Pinch-Jaw Chuck

Originally designed for machining of jet engine disks and rings, an automatic pinch-jaw chuck overcomes tooling problems when machining parts of large diameter and small cross section. A bulletin describes the new line. (Cushman Chuck Co.)

For free copy circle No. 10 on postcard, p. 175

Electric Brakes

The fully illustrated story of the newest of a line of electric brakes is set down in a 36-page report for design engineers. (Warner Electric Brake and Clutch Co.)

For free copy circle No. 11 on postcard, p. 175

Stainless Fastenings

A new 138-page catalog simplifies the work of engineers, buyers, and cost estimators in specifying a company's line of stainless and nylon fastenings. These include items such as bolts, nuts, screws, and washers. (Anti-Corrosive Metal Products Co., Inc.)

For free copy circle No. 12 on postcard, p. 175

Gold Plating

Industrial gold plating is analyzed in an 8-page technical paper. (Sel-Rex Corp.)

For free copy circle No. 13 on postcard, p. 175

Stainless Bar, Wire

Several fabricators improve their products and methods by using 17-4 PH and 17-7 PH stainless steel bar

and wire. So the supplier has decided to pass on this news via a new booklet. It gives brief case histories. (Armco Steel Corp.)

For free copy circle No. 14 on postcard, p. 175

Titanium Wire, Rod

Conversion tables for titanium wire and rod are available. They convert at-a-glance wire diameter sizes (0.002 to 0.200 in.) to lineal feet per pound; and round and square bar stock (1/16 to ¾ in.) to pounds per lineal foot. (Johnson & Funk Titanium Corp.)

For free copy circle No. 15 on postcard, p. 175

Cleans Aluminum

A data sheet describes a non-sludging, etch type cleaning compound for aluminum alloys. It's a dry powder used in solution. Varying etch depths, from light satin finish to deep stock removal, is easily controlled. (MacDermid, Inc.)

For free copy circle No. 16 on postcard, p. 175

Push Pilot Light

Literature introduces a push-to-test pilot light. A key feature of the unit is its pressure connection design. Connections are of silver-plated beryllium copper, which means no danger of broken wires. (Square D Co.)

For free copy circle No. 17 on postcard, p. 175

Machine Tool Switch

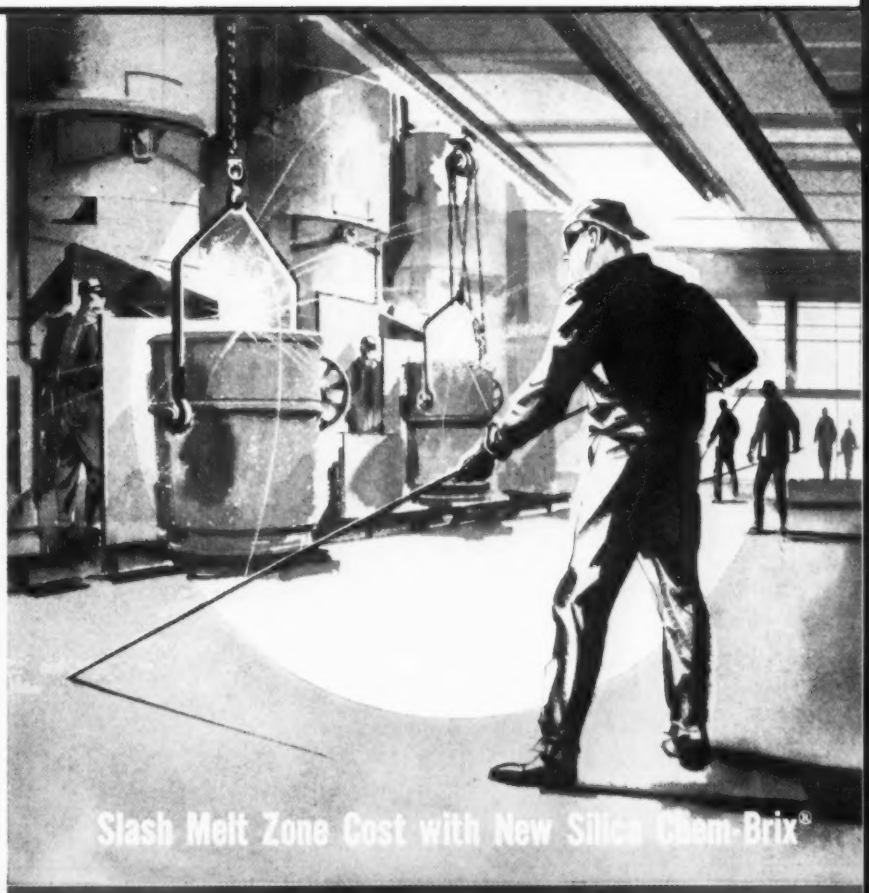
Of relatively simple design, a rotary synchronizing switch controls starting, stopping, interlocking, time-motion and sequence and recycling of machine tools. The precise mechanical limiting switch also works with mechanical press auxiliary equipment. A 4-page bulletin tells how it operates. (E. W. Bliss Co.)

For free copy circle No. 18 on postcard, p. 175

Thermocouples

Color codes and calibration symbols for thermocouples and thermocouple extension wires are contained in a handy chart. It also features pyrometer wire resistance figures. (Thermo Electric Co., Inc.)

For free copy circle No. 19 on postcard, p. 175



Silica Chem-Brix —a new, improved cupola block—actually cuts refractory cost per ton of iron by as much as ⅔! You can melt up to 160 tons without repairing. Unusually high slag resistance allows cleaner running slag for faster run-off. Since no mortar is used, no pre-heating is necessary. And new Silica Chem-Brix is available for any size cupola. Read how your foundry can achieve greater refractory economy in the melt zone. Write for our new booklet.

Illinois Clay Products are produced at Goose Lake, only 55 miles from Chicago. Fast, dependable service can be made by truck or rail.

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THERM-O-FLAKE INSULATION Coating, Brick, L. B. Block, Concrete;
CHEM-BRIX, Silica, Carbon.

ILLINOIS CLAY PRODUCTS CO.

Caught in the middle?

If grinding problems have you caught in the middle and you don't know which way to turn, switch to CINCINNATI (PD)® WHEELS. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control than *can save you money . . . and increase your production.*

Here's why you'll stop leading a dog's life when CINCINNATI (PD) WHEELS are on the job: Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.* So, we think you'll agree it's worth taking a close look at CINCINNATI (PD) WHEELS right away.

Just see your CINCINNATI Grinding Wheels Distributor. He'll be glad to explain how (PD) WHEELS can save you money and increase production. Or, contact us direct and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Trade Mark Reg. U.S. Pat. Off

CINCINNATI *Grinding Wheels*

FREE LITERATURE

Continued

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

Saw Sharpener

A new machine automatically sharpens all circular metal cutting saws from ½ to 14 in. diam. Carbon and high speed steel blades are ground with equal ease. It also works with all steels, brass, copper, bronze, aluminum, plastics, etc. New literature describes it. (Hamco Machines, Inc.)

For free copy circle No. 20 on postcard

Automated Deburring

A company's literature discusses an automated deburring machine. It describes the unit as an entirely new concept in the deburring and surface finishing of extremely long or large bulky parts. (Speed-D-Burr Corp.)

For free copy circle No. 21 on postcard

Hole Former

Tools using high speed steel for making holes in stainless and alloy steels on a production basis are described in a catalog. (Robert H. Clark Co.)

For free copy circle No. 22 on postcard

Regulator Valves

How to size one firm's sliding gate regulator valves is told in a 4-page bulletin. It explains how to adjust sizing for variations in pressure, temperature, viscosity, specific gravity, etc. (Jordan Corp.)

For free copy circle No. 23 on postcard

Close Center Drilling

Close center drill heads and automatic index tables are featured in a bulletin. It tells how these produce any combination of patterns of holes on a close center with high accuracy. (ConRay Corp.)

For free copy circle No. 24 on postcard

Collet Chucks

Increased capacity from 25 to 40 pct and greater precision production through use of a manufacturer's collet chucks are outlined in a new bulletin. For use on tool room lathes, engine lathes and grinders, the chuck accurately holds any bar that can be passed through the spindle without a cumbersome draw tube and adapter or sleeve inside the spindle hole. (Hardinge Bros., Inc.)

For free copy circle No. 25 on postcard

Bending Machines

A manufacturer of bending machines announces the publication of a new catalog with 90 illustrations of bending machines, showing over 65 different applications in bending tubing, pipe, extrusions, and rolled sections. (Pines Engineering Co., Inc.)

For free copy circle No. 26 on postcard

Steels for Die Casting

A new 16-page booklet gives the latest technical data about tool steels, their application, and heat treatment for the die casting process. (Crucible Steel Co. of America)

For free copy circle No. 27 on postcard

Hydraulic Turret Drill

An automatic hydraulic turret drill is the subject of a 12-page brochure covering both 6- and 8-spindle models. (Burg Tool Mfg. Co., Inc.)

For free copy circle No. 28 on postcard

Self-Locking Threads

A protruding nylon pellet permamanently inserted in the threaded section can be applied to any threaded part regardless of size, shape or function. The basic part can be supplied by the customer for processing or fabricated completely

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **11/14/57**

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FREE LITERATURE

by the maker. The four-page manual includes basic engineering recommendations, plus a check list for the design of threaded parts. (Nylok-Detroit Corp.)

For free copy circle No. 29 on postcard

Numerical Control

A two-page bulletin describes numerical control of production parts in automated assembly lines through the use of an automatic marking machine. (New Method Steel Stamps, Inc.)

For free copy circle No. 30 on postcard

Engineering Service

Engineering and design executives responsible for the completion of projects on schedule will be interested in a new six-page brochure. It stresses use of electronic digital computers. (Allstates Design & Development Co., Inc.)

For free copy circle No. 31 on postcard

Speed Reducers

Some 165 standard styles and sizes of double-reduction speed reducers in ratios ranging from 75:1 to 4900:1 are covered completely in a 20-page catalog. Reducers come in worm over, worm under or gear shaft vertical models. Output torque ratings range up to 618,000 in.-lb. (Cone-Drive Gears Div., Michigan Tool Co.)

For free copy circle No. 32 on postcard

Temperature Controls

Industrial batch ovens with a new temperature control are featured in a 4-page brochure. Ovens have automatic proportional wattage control and temperature range to 600°F, a capacity of 16 to 96 cu ft. Also covered: mechanical convection ovens, lab furnaces. (Blue M. Electric Co.)

For free copy circle No. 33 on postcard

Closed-Circuit TV

By combining closed-circuit TV with controls, cranes can be routed from a central station to eliminate individual operators. On arrival of crane at work station ground crews take over. It's an example of progress covered in an eight-page report. (Insul-8-Corp.)

For free copy circle No. 34 on postcard

Fixture Locating

Interchangeable sine fixture keys do a low-cost job of fixture locating. A new folder is complete with specifications and applications. (Jergens Tool Specialty Co.)

For free copy circle No. 35 on postcard

Production Conveyors

A four-page field report points to increased savings that have been realized through the use of conveyors. (Rapids-Standard Co., Inc.)

For free copy circle No. 36 on postcard

Filter Controller

A 12-page bulletin describes a flow controller for filter plants. (Simplex Valve & Meter Co.)

For free copy circle No. 37 on postcard

Heat Treating Furnaces

Shaker hearth and reciprocating hearth furnaces are covered in a collection of bulletins put together in a booklet. (American Gas Furnace Co.)

For free copy circle No. 38 on postcard

High-Pressure Valves

A line of valves with explosion-proof solenoid features a sealing ring in constant contact with the mating slide. The metal-to-metal sealing surfaces continue to lap themselves with each operation to maintain their sealing qualities for millions of cycles. The line is described in a new catalog. (Barksdale Valves)

For free copy circle No. 39 on postcard

Hole-Location Gage

An illustrated folder describes a new gage which is adjustable to most work pieces. The gage can be used for hole location or inspection. (Reana Products Inc.)

For free copy circle No. 40 on postcard

Make sure you're buying right

See PROGRESSIVE for parts like these

Progressive is saving its customers up to 70% on special fasteners. Very likely we can save you thousands of dollars on many of your small metal components.

On parts such as these, Progressive's cold forming method is superior to other fabricating techniques. Scrap is eliminated because the metal is formed into shape, not machined away as expensive scrap. Primary and secondary operations may be combined more readily to effect savings in machine time and between-machine materials handling. Work quality is just as you want it — we won't let it out unless it is.

You may have parts right now that our engineers could value analyze for you. Send us the prints. A Progressive quote is a sure indicator that you are buying right!

Machine screws and special fasteners are our business . . .
including square and hexagon machine screw nuts, Sems fasteners,
slotted tapping screws and Phillips Head Screws

STANDARDS AND SPECIALS CUSTOMIZED FOR YOUR NEEDS

THE PROGRESSIVE MFG. CO.
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RAMS

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HYDRAULIC EQUIPMENT

Hyde Park Rams are available in Chilled or Alloy Iron.

Furnished in hardness range to meet your specification . . . ground to your required size.

On your next replacement of Rams — or for new equipment—consult us. Our engineers will be glad to assist you.

Red Circle Rolls for every Purpose

Rolling Mill Equipment

Gray Iron Castings up to 80,000 lb.

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ROLLS
ROLLING MILL MACHINERY
GREY IRON CASTINGS

You Arbitrate It!

MONEY ISN'T EVERYTHING

From the files of the
American Arbitration Association

Ralph S. had been a shear operator in an automobile plant. A few years ago, however, he became a crane operator and worked his way up to the top rate for the job. Ralph's hourly rate of pay was higher than most others in the shop, but he wasn't quite satisfied. The work, he felt, was hard and he was subject to more lay-offs because he couldn't be transferred so easily to other jobs. It seemed to him that men in the floor stood a better chance of getting ahead.

And so, when a vacancy occurred for a shear operator, Ralph put in a bid, confident of getting his old job back. He was admittedly qualified for the work and, besides, the contract said that "in matters of layoffs, rehiring and promotions, seniority will be recognized."

But the personnel manager disagreed. "We can't consider your bid for the shear operator job, because you're already making more than that job pays. It would be downgrading, not a promotion."

"I may be making a higher hourly rate," Ralph answered, "but my take-home pay is lower. Besides money isn't everything."

Neither side could convince the other. They examined past practice. It was the first time such a request had come up. Finally the matter went to arbitration. Ralph continued to insist that he should be able to judge whether one job represented a "promotion" over another. The company answered that what Ralph wanted was simply a transfer, a problem covered by a different section of the contract.

The Arbitrator Ruled:

The company won. The arbitrator said "promotion" had to be given its usual meaning in the context of collective bargaining. That meant the job would have to pay a higher m i n i m u m and require greater skill. If the parties intended to permit downward "bumping" by seniority, they would have said so in the contract.

Caution: The award in this case is not necessarily an indication of how arbitrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.

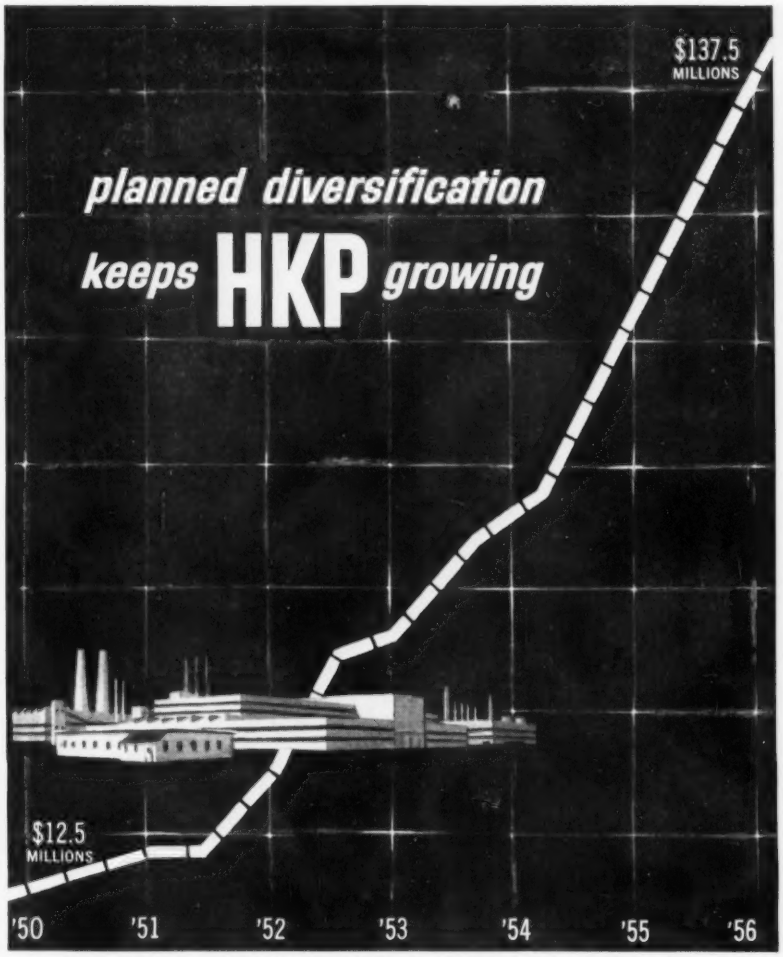
NEW BOOKS

"Manufacturing Processes," by M. L. Begeman. Every chapter of this fourth edition has been rewritten to place greater stress on principles and materials. New topics include electroforming, metal coating, electrospark machining, ultrasonic machining, chem-milling and automation. 612 pp. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y.

"Refrigeration, Air Conditioning and Cold Storage," by R. C. Gunther, explains the principles of modern cooling in simple terms. It supplies the required physics and progresses through refrigerants, the mechanical refrigeration cycle, equipment, controls, and finally, the application, operation and maintenance of a system. Special sections deal with brines, cold storage, lubrication, and air conditioning. 1232 pp. Chilton Co., Inc., Chestnut & 56th Sts., Philadelphia 39, Pa.

"Iron And Steel Works Of The World," edited by H. G. Cordero, provides a comprehensive and global review of the major plants in the industry. A new feature is the inclusion by Buyers' Guides which consist of quick reference tables for certain producing countries. These show the products of the individual plants and are a useful directory for buyers. 800 pp. $11.50 per copy. Quin Press Ltd., Birkett House, 27 Albemarle St., London, W.1.

"Engineering Encyclopedia," edited by F. D. Jones, comes in two volumes and provides, in handy reference form, essential facts about thousands of engineering and mechanical subjects. It defines a variety of terms used in actual engineering practice and is intended particularly for use in the mechanical industries. 1432 pp. $10. The Industrial Press, 148 Lafayette St., New York 13.



Acquisition of The Cleveland Hardware & Forging Company brings to eleven the number of versatile Porter divisions. They manufacture products in 40 plants in the United States and Canada, four of which have been acquired so far this year.

Serving industry's needs is a prime responsibility at H. K. Porter Company, Inc. Porter maintains intensive development programs which are translated into new manufacturing developments almost every month.

This awareness of the needs of the market place has resulted in a program of planned diversification...**and a 1150% increase in Porter business volume since 1950.** This volume comes from divisions manufacturing steel and fabricated steel products, copper-alloy metal products, electrical equipment, refractories and industrial rubber, wire and cable.

H. K. PORTER COMPANY, INC.

CLEVELAND · CONNORS STEEL · DELTA-STAR ELECTRIC · HENRY DISSTON · RIVERSIDE-ALLOY METAL
LESCHEN WIRE ROPE · QUAKER RUBBER · REFRACTORIES · VULCAN CRUCIBLE STEEL · W-S FITTINGS
H. K. PORTER COMPANY (CANADA) LTD.

Operating Mockup Cuts Design Time

With so many plating methods, design facilities for plating lines have to be flexible.

Here's where a company gets away from dependence on the drawing board and gets the benefits of testing and development on a large scale mockup.

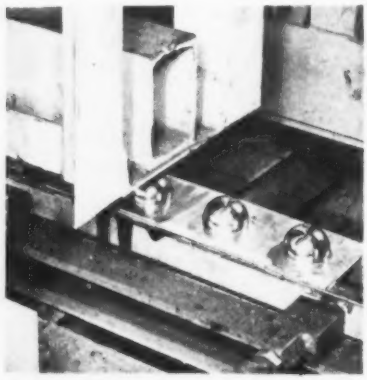
▪ Normally, product design starts 100 pct on the drawing boards. But the plating equipment division of Wagner Brothers Inc., Detroit, doubled up and began by combining the drawing board technique with a large scale operating mockup.

Cuts Design Time—As a result of the feedback of practical intelligence from "tadmu," as the 12-ton, 31-ft production floor laboratory or mockup is called, the company developed an over-all system of manufacturing. It's the key to quick creation of automated, custom-ordered plating equipment, and subsequent fabrication on a semi-mass production basis.

The new system promises to not only reduce costs of plating equipment installation for users, but also plating operation costs. It's a design approach that eliminates 65 pct of the time required for layout.

The mockup unit represents 1½ modular repetitive sections of an actual automatic plating machine. It's a proving ground for development and testing.

Ball Bearings for Alignment—An important development resulting from the mockup testing is the use of ball bearings, rather than cylindrical rollers to support the plating machine carriage. The ball bearings offer smoother carriage action, provide an inherent clearance take-up feature, help keep the carriage automatically centered and adjusted relative to the center line of the machine.



Mockup shows better alignment with ball bearings.

By using soft, cold-working steel for the V-grooved tracks, the balls Brinell two narrow grooves in each of the tracks in a manner which automatically compensates for irregularities in the base of the machine. These track grooves soon acquire a mirror finish, and become work-hardened by the rolling action of the balls. Balls are of stainless steel and roll in a "spiral" path to prevent the formation of flat spots.

Forging Press Features Large Capacity

A new 2000-ton hydraulic forging press for hot working of steel, titanium and other metals has been placed in operation at the Dunkirk Works of Allegheny Ludlum Steel Corp. It can forge steel shapes up to 80 in. in width and weighing as much as 28,000 lb in a wide variety of shapes, including large size blocks, discs, sleeves, rings, round bars, flats and billets.

The press and its auxiliary equipment are housed in a new, stainless steel-clad building containing about 50,000 sq ft of floor space. Incor-

● One well-known stove manufacturer wanted to speed-up assembly—a call to Reading Engineers led to complete solution. A 10-ton, double I-Beam, cab-controlled Reading Crane brought even better results than expected.

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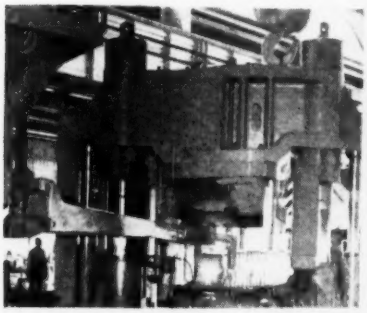
Want More Data?

You may secure additional information on any item briefed in this section by using the reply card on page 175. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

porating automatic control features, the press gets fast, economical hot forming of metal shapes.

A substantial portion of the time on the new press will be devoted to forging extra large sizes of tool and die steels.



Automatic controls aid handling of heavy forgings.

The new forging press was built by Lake Erie Engineering Corp., Buffalo, to specifications worked out in cooperation with the engineering department of Allegheny Ludlum.

Hood Withstands Corrosive Gases

A fire-retardant polyester resin, surmounts a corrosion problem which has long been a high-cost maintenance item at Hooker Electrochemical Co., Niagara Falls, N. Y. The problem was to find the most suitable material for large hoods exposed to highly corrosive warm gases formed in the manufacture of chemicals.

Four plastic hoods of Hooker's Hetron 92 resin have now been exposed to corrosive conditions for more than a year and three for a shorter period, with no evidence of deterioration. The hoods present a smooth surface on the underside exposed to corrosive elements. It means no bolts or nuts are exposed to corrosion.

Simple Assembly — The plastic hoods are fabricated in three sections with outside flanges requiring only 42 uncoated nuts and bolts for assembly. The joints are readily sealed with roofing compound. Weighing only 375 lbs, the three parts can be lifted and installed

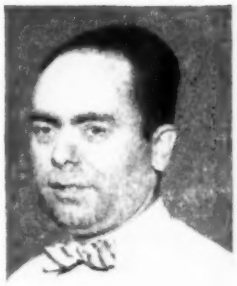
Solving problems with VULCAN Tool Steels:

Production run tripled

Until recently, a run of 200,000 switch boxes on a double-acting draw press was an accepted standard at Steel City Electric Company, Pittsburgh. The compound die used in this single-stroke blanking and drawing application is subjected to severe abrasion. The boxes come off the press hot.

Under pressure for greater production, Vulcan Alidie tool steel was used for the complete tooling set-up. 688,000 boxes were produced in one tool run. Inspection proved that the run could have gone even longer.

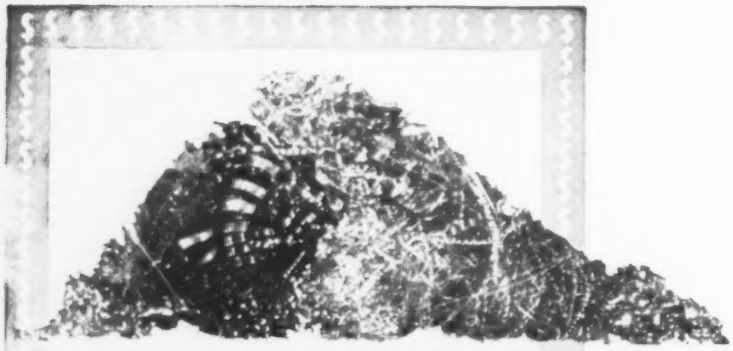
Is there room for this kind of improvement in your production schedule? Talk to your Vulcan representative—your specialist in *forged* tool steels. *Vulcan Crucible Steel Division, H. K. Porter Company, Inc. Aliquippa, Pa. Offices and warehouses in principal cities.*



Jesse Casasanta, tool and die superviser, Steel City Electric Company, calls the performance of Vulcan Alidie Tool Steel in this test "a near miracle."

H. K. PORTER COMPANY, INC.

VULCAN CRUCIBLE STEEL DIVISION



THERE ARE EXTRA DOLLARS IN THIS SCRAP PILE!

...when you install an

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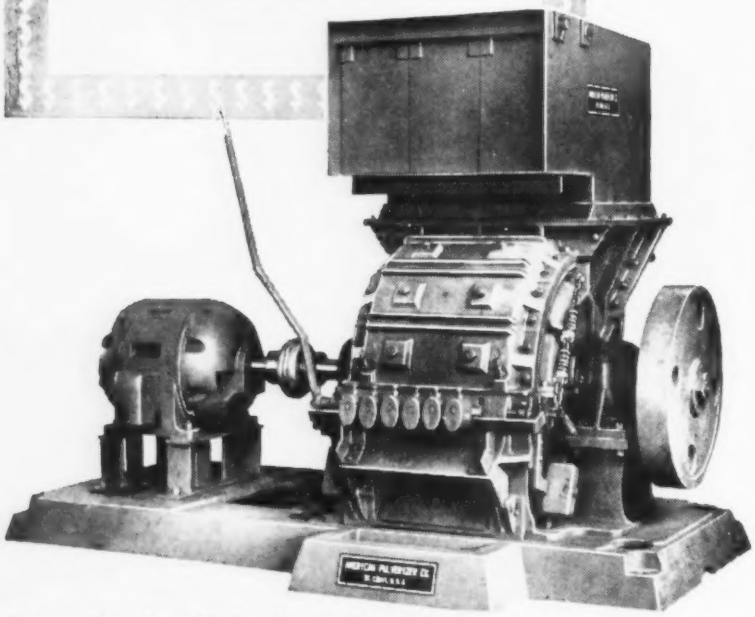
METAL TURNINGS

CRUSHER



Pays for itself in 3 Profitable Ways:

1. **TOP SCRAP VALUE.** Uniform short shoveling turnings produced by an American bring up to $4 per ton more than regular machine shop turnings.
2. **INCREASED CUTTING OIL RECOVERY.** Up to 50 gallons per ton are released from turnings reduced in an American.
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Available in 1 to 10 tons per hour capacities to meet your needs. WRITE today for the complete American profit story.

American

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Originators and Manufacturers of Ring Crushers and Pulverizers

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easily without any help from a hoist.

Each chemical manufacturing unit requires rebuilding about every two years. With the Hetron hood, it is easy to remove the bolts, raise the key central section by hand, and put it aside until reinstallment. It allows unrestricted working space.

Die Lubricant Improves Metal Flow

A special die lubricant designed for heavy-duty hammer forging operations is aiding production at Steel Improvement & Forge Co., Cleveland. Compounded by D. A. Stuart Oil Co., Ltd., Chicago, it's especially adapted for work on stainless and titanium alloys. Improved metal flow in the die and reduced sticking are cited as benefits by production executives.

Lubricant, applied with swab, results in better forgings.

Aircraft Service—Forging billets for landing gear struts for jet airliners weigh about 1800 lb and are heated to forging temperature in large gas furnaces. They are carried to the forging hammer by a special tractor equipped with a remotely controlled work-handling claw.

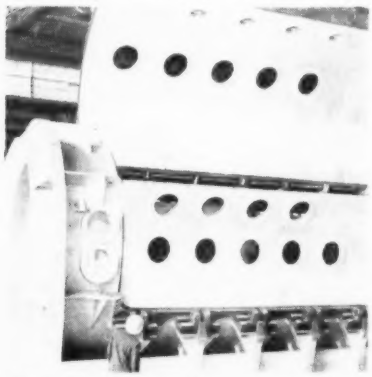
Erie steam hammers (35,000-lb capacity) drop forge the hot SAE 4340 metal into landing struts in a total of four separate operations. Two heats each are required for blocking and two more for finishing operations.

No special equipment is needed to apply the lubricant to the forging

hammer dies. The material is swabbed onto the die by hand after each hammer blow. The dies stay relatively clean.

Test Cell Simulates Altitude

Weighing 230,000 lb, the main section of an altitude test cell for the Air Force is the final section fabricated by United Concrete Pipe



Cell has capacity to test full-scale aircraft sections.

Corp.'s Baldwin Park plant for Marquardt Aircraft Co., Van Nuys, Calif., who are producing the complete unit.

Shipped in five sections, the assembled test cell will be 94-ft long with a maximum height of 36 ft.

Low Pressures—Test models will be placed in the cell for testing at extremely low pressures such as those encountered at high altitudes. The 45-ton, 30- by 20-ft door had to be fitted within very close tolerances.

Fabricated of steel plate ranging from ¾ to 1 in. thick with 1½ in. thick special glass in the portholes, the vessel will be capable of withstanding complete vacuum as well as internal pressures up to 90 psi.

Horizontal Grate Cools Efficiently

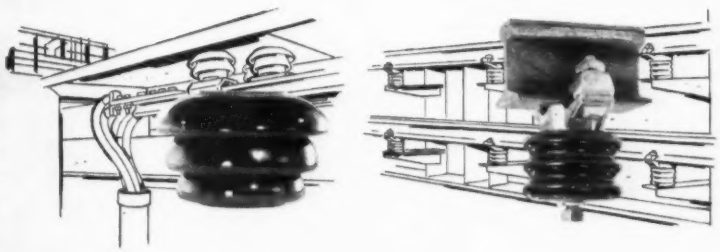
Greater cooling efficiency is combined with space savings in a horizontal-grate cooler, developed by Fuller Co., a subsidiary of General American Transportation Corp., Catasauqua, Pa.

Designed to cool materials dis-

STRENGTH

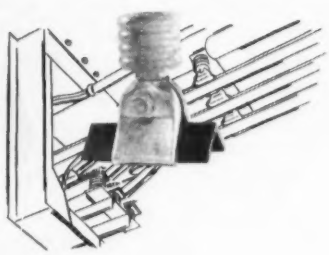
Which kind of strength do you need in insulators for traveling-contact equipment?

MAXIMUM ELECTRICAL STRENGTH



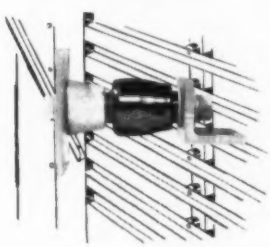
Wet-process porcelain insulators, such as these, offer outstanding electrical properties for high-voltage contact-rail insulation. Especially recommended where dirt, moisture, and other contaminants prevail.
Also available are dry-process porcelain units for power circuits.

MAXIMUM IMPACT STRENGTH



Molded polyester-fiberglass insulators and fabric-reinforced insulators of this general type have exceptional impact strength and vibration-resistance combined with good electrical properties. Tailored to resist chemicals, thermal shock, weathering.

MAXIMUM TENSILE STRENGTH



Molded Giant Strain insulators, adaptable to miniaturization where space is restricted, offer unusual mechanical strength. A very economical insulator having diverse applications.

TO HELP YOU DECIDE

. . . on the right combination of properties to meet your insulator needs, Delta-Star engineers from coast to coast invite your problems. Phone the nearest Delta-Star district office or write to Electric Service Works, Delta-Star Electric Division, H. K. Porter Company, Inc., 17th & Cambria Sts., Philadelphia 32, Pa.

H. K. PORTER COMPANY, INC.
DELTA-STAR ELECTRIC DIVISION

charged from rotary kilns, sintering machines, roasters and various types of furnaces, the new unit handles materials ranging in size from fine foundry sand to clinkers and pellets. The horizontal grate design eliminates the extra headroom needed to accommodate the inclined grate of conventional units.

Distributes Load Faster—As in an inclined-grate cooler, movable and stationary grates alternate. But with the grates on a horizontal plane, material is pushed by the movable grates up and over the noses of the stationary ones. Resistance of the material causes immediate horizontal spread across the cooler bed, thereby permitting use of wider and shorter coolers where needed.

Cooling air from the air chamber is forced through the horizontal spaces between the grates, and through the vertical grate openings. Constant motion of the movable grates changes position of material as it is tumbled from grate to grate, thus exposing all surfaces of material to the flow of air to give faster cooling.

Three-Component Control—The horizontal cooler features a new control system which enables the cooler grates to operate at maximum efficiency and stabilizes kiln operation. The temperature of the the kiln or furnace determines the air used for combustion of fuel in amount of air admitted under the grate compartment at the hot end of the cooler.

Under-grate pressure, in turn, determines the speed of the grates. The travel of the material bed varies automatically to maintain a uniform thickness and resistance to the flow of cooling air.

At the same time, hood kiln or furnace draft determines the amount of air vented to the atmosphere.

Simple Design—The material discharged from a kiln or furnace drops through a vertical throat and is distributed upon the wedge-type grates to form a uniformly flat, horizontal bed.

Stationary grate plates extend across the chamber on supports which are bolted to the side-members of the rigid frame. Supports for the movable grates are bolted to a second rigid frame, supported on axles, with flanged wheels, running on a short track.

The frame supporting the movable grates is given its motion by means of a crank-type drive. Driveshaft speed may be manually or automatically controlled to produce the desired depth of material on the cooler grates.

Gap Press Stands Long Service

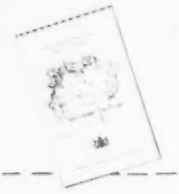
Operating three shifts a day, five days a week for almost a year a gap press built by Hamilton Div., Baldwin-Lima-Hamilton Corp., Hamilton, O., came through without downtime and with only routine maintenance. The big press is doing

"We found a
GOLD MINE OF
TOP-QUALITY
LABOR
in Uniontown, Pa."

...says W. F. Rockwell, Jr., President
Rockwell Manufacturing Company

Rockwell Manufacturing opened its water meter plant in Uniontown, Pa., in 1953 — substantially enlarged it in 1956. Here's how Mr. Rockwell feels about the high quality of the labor available in this typical WESTern PENNsylvania community:

"Our production calls for a lot of highly skilled precision work performed to close tolerances. Our Uniontown employees have proved that a solid mining community background fits people for this sort of employment. They took very little time to train — and have turned in a record performance. We attribute these standout qualities to a fairly high level of mechanical aptitude and skill, plus a sound, healthy attitude toward work."



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FAYETTE COUNTY SKILL SURVEY*

Considering a new plant location? Get this unique, factual study of specific skills possessed by *available* workers in this typical WESTern PENNsylvania area. Check it against the skills *you* need. Mail coupon below.

*Prepared January, 1957 by Penna. Dept. of Labor and Industry

Area Development Department IA 5
West Penn Power Company
Cabin Hill, Greensburg, Pa.
I would like a copy of the "Fayette County Skill Survey", showing specific mechanical aptitudes and skills available in the area.

Name Title
Company
Address
City and State

WEST PENN POWER
an operating unit of the WEST PENN ELECTRIC SYSTEM

its job at the Stamping Div., Eaton Mfg. Co., Cleveland.

Faced with the problem of producing automobile grill guards as much as one-third larger than those on previous model cars, Eaton solved the problem by purchasing the large and flexible blanking press. The bed dimensions are 72 by 36 in. The steel stock normally used has a gage of .098 in. and has small amounts of added aluminum for greater ductility.

Accessible From Four Sides — The press can run a wide range of sizes with handling either from side to side or front to back. On the smaller presses formerly used on similar jobs, it was impossible to go through the back of the press, whereas the Hamilton press can accommodate a 60-in. wide sheet from front to back.

Maintenance of the gap press is easy because of its simple, rugged construction and accessibility. Inspectors can make fast checks of

Rugged build results in trouble-free operation.

the press under the plant-wide preventive maintenance program to catch trouble before it starts.

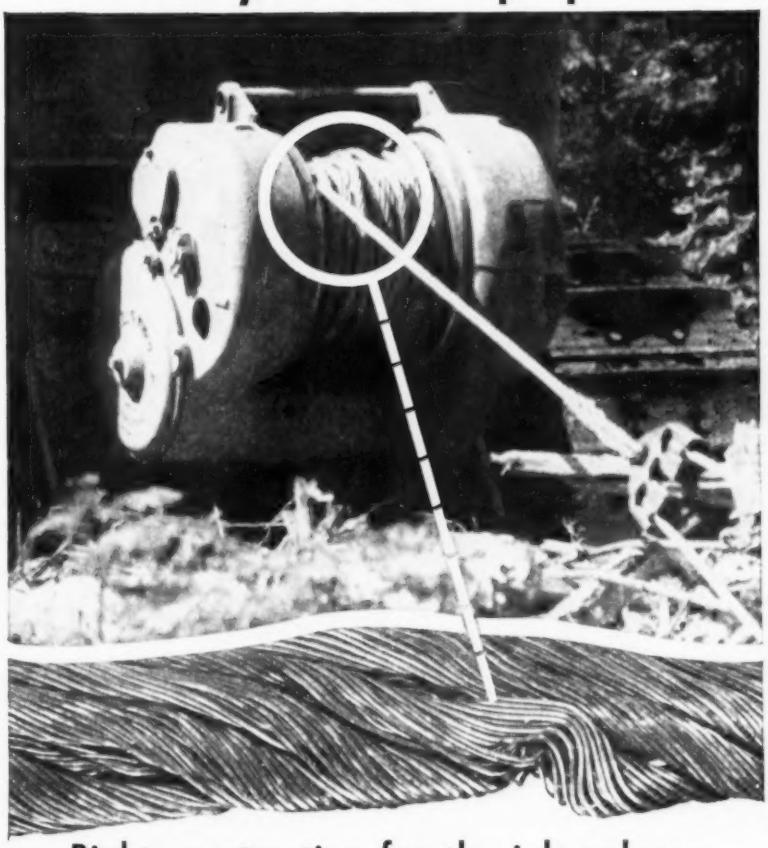
In addition to blanking, the press also can draw and stamp, although Eaton uses it only for blanking at the present. It can take long work, up to 72 in. in length, and can draw to a depth of 5 in.

Speed of operation ranges up to a maximum of about 24 strokes per minute. One or two operators work the press depending on the size and weight of the work.

The press now is undergoing modification for automated operation through the addition of a coil feeder. The new equipment will feed and

crushing...

is this your wire rope problem?



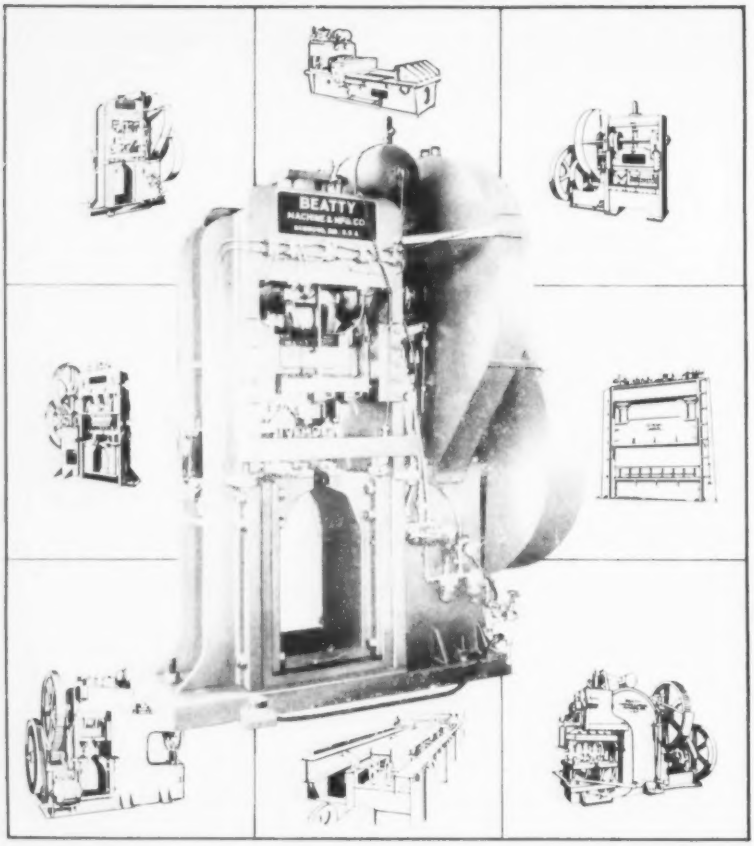
Right construction for the job reduces downtime...cuts wire rope costs!

SEND FOR LESCHEN "*RED-STRAND*" BULLETIN NO. 102

Once wire rope is crushed or pinched out of shape on sheaves or drums, useful life is drastically shortened. More often than not, this loss can be prevented. Minor changes in equipment, adequate inspection or using the most suitable rope construction may eliminate the difficulty entirely. These and other solutions are clearly explained in Bulletin No. 102 which is yours for the asking. By all means write for your copy today. Feel free, too, to ask for solutions of any other wire rope problems you'd like to have solved. The full resources of our engineering staff and field organization are at your service. Address: Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Missouri.

LESCHEN
Red-Strand
WIRE ROPE

H. K. PORTER COMPANY, INC.
LESCHEN WIRE ROPE DIVISION



IN ONLY 2 PASSES INSTEAD OF 4 . . .

This new No. 7 Detail Flange Punch accomplishes the flange punching of I-beams in only two passes, where ordinary equipment requires four passes. There's production speed that pays off every hour of operation. Especially designed to speed single-hole flange punching in small structural steel fabricating shops, this compact punch incorporates entirely new design that eliminates the end-for-end turning of beams — requires less floor space than open-throat installations.

The punch has 100-ton capacity, mechanically driven guillotine-type. It will punch up to 1¼" diameter hole through 1" mild steel and handles beams with 6" to 36" webs. Opening through frame is 26", length of stroke — 2", distance ram to table, stroke up — 12".

WRITE FOR FULL DETAILS

Get full information on this compact, high production flange punch . . . or on the complete line of Beatty heavy metal-working equipment.

BEATTY MACHINE & MFG. CO.
936 150th St. Hammond, Indiana

index coil stock to the press automatically. Operation up to 30 strokes per minute then can be attained.

Alloy Unit Takes Special Welds

It was welding skill and experienced workers that produced X-ray quality welds on zirconium tetrachloride condensers fabricated of Inconel nickel-chromium alloy by Rolock, Inc., Fairfield, Conn.

The condensers form a part of the equipment required for a new

X-ray inspection shows sound welds in condenser unit.

process producing zirconium at nearly one-half the current market price. The process will be housed in the new Columbia-National Corp. plant near Pensacola, Fla., to supply zirconium to the Atomic Energy Commission, and to industry as well.

Steel Jacket for Cooling — The units consist of Inconel columns 3 ft ID by 13 ft high. Each will be partially covered by a mild steel jacket through which cooling air will be blown.

All welds are made with "62" Inconel filler wire of 0.045-in. diam, except where dissimilar metals are involved. In these cases Inco-Rod "A" electrode is used.

The edge preparation is normal for materials having the thickness of this condenser. All welds were com-

is not unusual to have over 300 weekly. Various types of conveyors

pletely X-rayed using portable, capsule, gamma ray equipment. Argon shielding gas was used with the power source an Airco unit.

The unit will be used to condense zirconium tetrachloride which goes from gas to solid at 330°C. It will also be exposed to heavy concentrations of chlorine, as well as small or trace amounts of metallic chloride, such as aluminum, silicon and iron chloride.

Two-Dimensional Unit Speeds Tracer Work

A two-dimensional table and saddle duplicating attachment is designed for following irregular shaped contours. It's a development of the U. S. Burke Machine Tool Div., Cincinnati, for operation with U. S. Vertical milling machines.

The 20 by 10-in. duplicating attachment is complete with pencil type stylus. The operator holds the stylus in contact with a ferrous or nonferrous master. The milling machine automatically follows the movements in both horizontal planes at the pre-determined optimum feed rate.

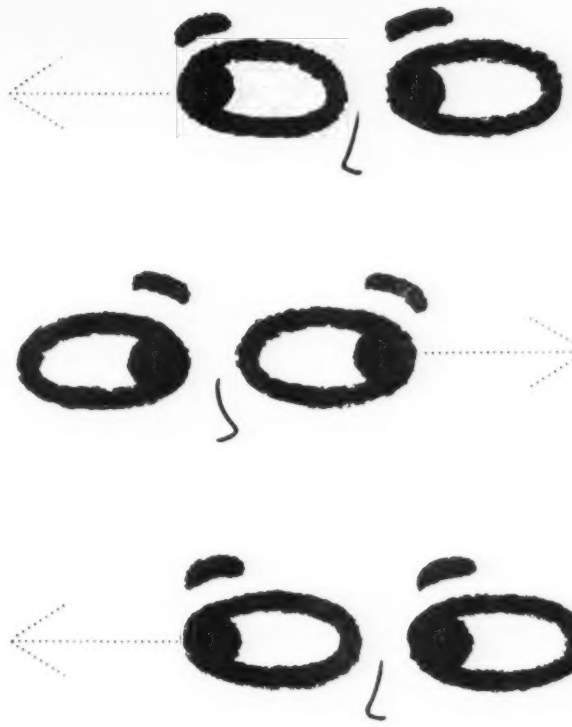
Retains Feed Screw—The longitudinal table feed screw is retained, permitting manual longitudinal table movement in any position. An antibacklash feed nut is provided to insure continuing accuracy.

Among the optional accessories are a magnetic stylus, as well as an automatic rise and fall knee attachment coordinated to the movement of the table and saddle hydraulic cylinders.

Range and capacity of the mill are in no way limited by the duplicating attachment. The unit offers a choice of 24 different spindle speeds in a range from 65 to 2850 rpm. It handles a wide range of parts and materials.

Foundry Unit Broadens Scope

Where foundry production at Draper Corp., Hopedale, Mass., used to be absorbed by its own man-



Alternating stresses bear watching!

Back and forth . . . up and down . . . in and out . . . if those stresses keep changing, the life of a metal part is a hard one . . . and often a short one. Stress reversals can cause "fatigue" failure at stresses far below the expected strength of the metal. One of the outstanding properties of phosphor bronze is its high resistance to fatigue failure. It is widely used for electrical switch parts, relay contact springs, bellows, rotating shafts and other moving or vibrating parts.

For detailed information on phosphor bronze, write to Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.

ALLOY METAL WIRE
Prospect Park, Pa.

RIVERSIDE METAL
Riverside, N.J.

PRENTISS WIRE MILLS
Holyoke, Mass.

H. K. PORTER COMPANY, INC.
RIVERSIDE-ALLOY METAL DIVISION

ufacturing requirements in automatic looms for the textile industry. The company has broadened its scope to production of gray iron and aluminum castings for other industries. The foundry covers an area of 360,000 square feet with a potential daily production of close to 400 tons—a foundry where it is not unusual to have over 300 different jobs passing through simultaneously, with casting weights varying from one ounce to ½ ton.

High Output — The briquetting equipment prepares cast iron chips for use in the melt at a rate of 3 tons every 55 minutes. Cranes and transfer cars load three cupolas taking charges totalling 9700 lb.

The core room uses 35 tons of sand in producing 145,000 cores weekly. Various types of conveyors move materials through the molding, heat treating, cleaning and snagging, and dip-paint areas.

Production in this foundry in-

Mill widens scope to produce castings for many industries.

cludes 20,000, 30,000, and 40,000 tensile iron. Laboratory controls maintain physical and chemical properties.

Switch to Cold Heading Cuts Costs

Cold heading techniques often permit manufacturers to cut the cost of producing small and medium size (maximum length about six in.) parts. The process also produces a component stronger than the metal from which it is made.

Actually, cold heading may do one or all of the following: 1. eliminate extra operations; 2. allow use of fewer parts; 3. make the component faster; 4. cut scrap losses in production.

For Example — By making a hose clamp adjusting screw in one piece in a cold heading machine, Russell, Burdsall & Ward Nut & Bolt Co., Port Chester, N. Y., has reduced the customer's material and assembly costs. Formerly, the basic piece was machined in a screw machine and a stamping, which fitted around the head to prevent the screw driver from slipping, was added during assembly operations.

The cold heading machine now rolls the thread and forms the head with a flange. After the head is

ERIE Bolts • Studs • Cap Screws • Nuts
In Alloys • Stainless • Carbon • Bronze

Only the hands of the specialist can produce fasteners which will meet your design and engineering specifications with precise accuracy. Erie has been doing just that for more than 40 years . . . producing to customer specifications bolts, studs, cap screws and nuts for use in extreme temperature, corrosion and tensile applications for a wide diversity of industries. Submit your specifications to us with confidence.

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ERIE BOLT & NUT CO.
Erie, Pennsylvania
Representatives in Principal Cities

slotted, the flange is forced up around the top in an operation similar to the trimming done on a bolt head. The screwdriver shield is now an integral part of the piece.

In cold heading a leveling screw, R B & W also reduces cost and improves quality of the product. The part is made in a bolt making machine at the same high speed used for making standard bolts. It was formerly made by riveting a flat head to a set screw. The less expensive cold headed part is also stronger than the two-piece assembly.

In Another Case — An insert screw, which is imbedded in a die cast plastic part, was formerly cut in a screw machine. Now cold headed in a bolt making machine, savings in material and time add up to 40 pct. The part is also stronger as the flow lines of the material are not cut in the one-pass threading and knurling processes.

Threading and knurling are natural low-cost adjuncts to cold heading operations because the work is done in one machine without additional handling of parts.

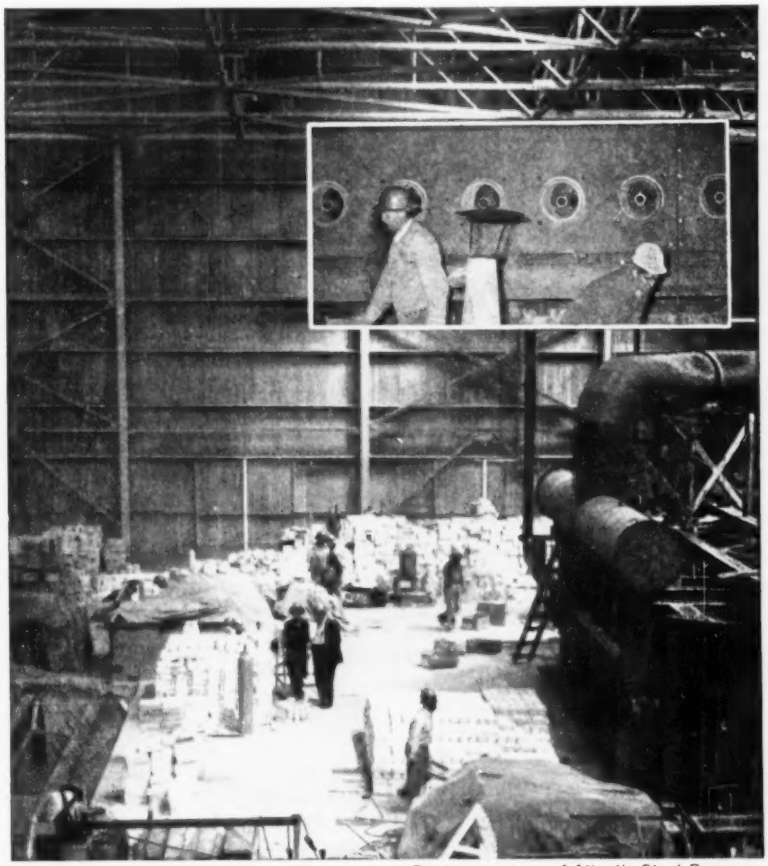
How Much Radiation Can A Motor Take?

A new field of practical nuclear research was opened recently when a silicone-insulated motor was deliberately exposed to a radioactive source. The motor test will lead investigations of radiation effects on complete electrical insulating systems.

The motor is a standard 1 hp, 182 frame, 1800 rpm, 3-phase, 440-v, squirrel cage machine. It is absorbing gamma ray energy at the rate of 0.1 megarads per hour. To simulate on-the-job service in, for example, an atomic power plant, the motor is being reversed every three seconds or so to maintain an operating temperature of 200°C.

Other Tests Planned—Additional tests are planned for a variety of silicone-insulated motorettes, capacitors, wire, cable, and electronic

Profitable Trends in the use of Refractories



Photos courtesy of Atlantic Steel Company

New furnaces start right with Laclede-Christy Refractories

Specifications on Atlantic Steel Company's new 13″ Bar and Rod Mill included a 90 ton per hour reheating furnace. They called on a leader in the field, Rust Furnace Company, to build it. Rust's experience and knowledge prompted their use of Laclede-Christy refractories.

The installation included Spallac super-duty fire brick which has proved its long-lasting qualities in other installations . . . requiring minimum maintenance and reducing downtime. Spallac super-duty features high refractory value, good volume stability, and high resistance to spalling. Also included was Laclede King high duty brick.

To start your furnace right—for new or replacement installations, it pays to use Laclede refractories. Call Laclede-Christy Works, Refractories Division, H. K. Porter Company, Inc., St. Louis 10, Mo.

H. K. PORTER COMPANY, INC.
REFRACTORIES DIVISION
LACLEDE-CHRISTY WORKS

HOW DATED ARE YOUR IDEAS ABOUT SMOKE CONTROL?

MAKE SURE THAT YOU HAVE THE MOST EFFICIENT METHOD FOR YOUR PARTICULAR PROBLEM

Most reliable air pollution engineers agree that electrostatic precipitation has the widest range of application for controlling smoke and the resulting odor. The SMOKATRON electrical precipitator meets the qualifications of today's rigid smoke controls, and is designed to remain effective in the face of even more stringent controls. Ask about our deferred payment plan.

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Smokatron Division
Summer & Co.
555 Buttles Ave.
Columbus, Ohio

TECHNICAL BRIEFS

assemblies. Many of these items will be oven-aged at 200° C at the same time they're being exposed to the source.

How long will the motor last? C. G. Currin, Product Engineering Laboratories, Dow Corning Corp., predicts: "Experience with many types of silicones indicates that this motor should run at least 10 years."

Hundreds of different silicone fluids, resins and rubbers have already been checked after absorbing from 2 to 2000 megarads. Electrical characteristics proved more stable than physical properties in almost every case. As a group, the resins are the most resistant of all silicones to radiation.

Fluids Will Gel—Silicone fluids tend to gel on prolonged exposure. Silicone rubber, which has a degree of cross-linkage, hardens and loses resilience. However, it still remains useful in many applications where maximum flexibility is not required. Silastic-insulated wire has been found still serviceable after soaking up as much as 200 megarads.

A significant difference was noted between electric properties measured during and after radiation. During exposure, some properties appear to vary as the intensity of the source is varied. After exposure, however, total change in physical or electrical properties is primarily a function of the total radiation the materials have absorbed.

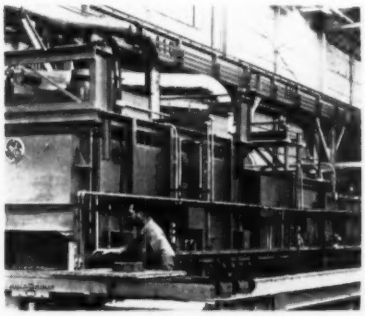
The motor-test program will also enable Dow Corning to test out new materials designed for radiation resistance. The grease used in the bearings of the test motor, for example, is an experimental compound especially developed for the purpose.

Furnace Provides Flexible Treatment

A roller-hearth furnace is part of the new automated production line for General Electric's Small A-C Motor and Generator Dept., Sche-

nectady. It cuts a double annealing operation in half by annealing both the stator punchings and weld in one pass.

Key to the flexibility of this 108-ft long electric furnace, which anneals up to 3000 lb of rotor and



Furnace gets its flexibility by control of heating zones.

stator cores in one hour, is the wide variety of combinations of heating and cooling cycles.

Eight controlled heating zones include pre-heat and burn-off zones to provide controlled rate of heat-up. Four controlled cooling zones and a 6-to-1 ratio conveyor drive give additional flexibility for special annealing requirements.

A centralized lubrication system reduces furnace maintenance. Only one man is required to supervise the automated setup.

Simple Meter Control Speeds Ball Grinding

A grinder control circuit, built around a contact meter-relay that uses fluctuating motor load as a guide to automatic regulation, boosts output 33 pct per machine in grinding steel balls to ±0.0005 in. in diam.

The control system operates on the principle that motor load will vary with grinding pressure. This load is continually indicated on the dial of the meter-relay, furnished by Assembly Products, Inc., Chesterland, O.

Two pointers on the dial are set at the permissible high and low load limits. When the load reaches either extreme, contacts lock on both the indicating and the fixed pointers,

a bright new wire with a brighter tighter finish

SO BRIGHT – Use *Brytite* wherever a shinier, brighter zinc coating is desired for long lasting, more sparkling product appearance. Eliminate polishing and special finishing operations

SO TIGHT – Brytite has remarkable forming qualities. The zinc coating is so tight it will withstand severe deformation of the base metal without flaking, powdering or peeling.

SO CLEAN AND SMOOTH – Satin smooth in looks and feel, BRYTITE immediately raises the quality appeal of your product. You get smoother production, too – the result of precise uniformity and quality controls.

ROUND AND SPECIAL SHAPES – *Brytite* is available in many sizes in round wire, and may on inquiry, be furnished in standard and special shapes – flat, half-round, oval, half-oval, square, rectangular, and many others.

Brytite

A PATENTED GALVANIZING PROCESS ®

TEMPERS AND ANALYSES – Specify BRYTITE in various tempers and analyses in the low carbon and medium low carbon steels.

FINISHES – Satin Finish, Unwiped (where a heavy weight of zinc coating is required) and Redrawn, in certain sizes.

no polishing...no buffing...no finishing...

withstands difficult forming operations

CONTINENTAL STEEL

CORPORATION · KOKOMO, INDIANA

PRODUCERS OF Manufacturer's Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, BRYTITE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence and other products.

and the system adjusts grinding pressure back to normal.

A complete rough-to-finish cycle on each machine, now requires only six hours, compared to the former eight.

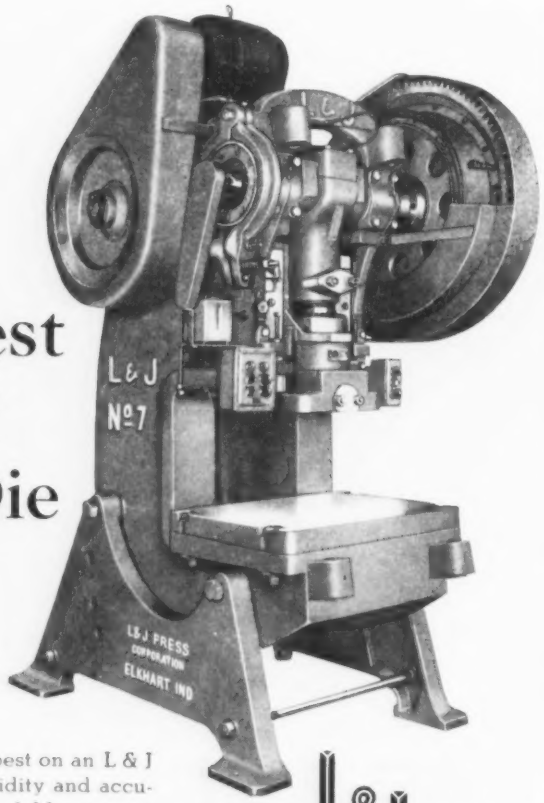
Screw-Feed Fixture—At 115 v, contacts for the meter-relay are connected to the starter coil of a feed motor that operates a screw for advancing or retracting a vertical plate. The steel balls move constantly in a circular channel in the plate and are ground by a vertical wheel.

When the motor load falls to the low limit on the meter-relay, indicating grinding pressure is too light, the plate carrying the steel balls moves closer to the grinding wheel. Conversely, too much load causes the plate to back off. In addition, the high limit acts as a safety feature, since too much grinding pressure could break the grinding wheel.

To provide close control accuracy and to prevent the screw from moving too far in either direction while adjusting grinding pressure, a self-releasing circuit is used with the meter-relay. At either the high or low load limit, this circuit samples the signal to see if the load has returned to normal; it also takes corrective action while the load is being sampled.

As a further protection against reversing the screw drive too far, a limit switch is used. To permit manual control, there is a four-pole manual-automatic switch ahead of the meter-relay.

Gets the Best out of Any Die



Any die will do its best on an L & J No. 7 Press. The rigidity and accuracy of these dependable presses provide accurate die alignment that minimizes wear, and insures precision stampings. They also enable dies to produce maximum output for these presses are efficient, versatile and require but minimum maintenance. If productivity, tolerances and die life are important to you, then you'll be interested in the complete story of L & J No. 7 presses.

NO. 7 L&J PRESS

Specifications

Capacity — 75 tons. **Stroke** — 4", special max. — 8". **Speed** — 42 s.p.m. (85 s.p.m., non-geared). **Throat Depth** — 13½". **Die Space**, standard — 14", special max. — 23". **Bolster Plate** — 36" x 26" x 3". Also available in non-geared model. Air clutch optional at extra cost.

WRITE FOR CATALOG of 24 geared and non-geared O B I Punch Presses of 14 to 90 ton capacities. Also, 20 to 100 ton Double Crank, High Speed, Straight Side Presses.

L & J PRESS CORPORATION 1623 STERLING AVE. ELKHART, INDIANA

Computers Now "Talk" to Each Other

Can IBM "talk" to Electrodata or Sperry-Rand to RCA Bizmac? Management wants to know. The input and output coding "language" for most computers and electronic data processing machines differs widely.

With more business offices and industrial plants installing electronic data processing (and in many cases more than one type of computer) the question whether one system can talk to another becomes critical.

Adds an Item—As a proposed answer, the Electronic Engineering Co. of Calif. developed a computer-language translator to convert data from one computer to a format compatible with a different system. Although this puts another piece of electronic equipment into a data processing installation, it does claim to increase operational flexibility.

For example, some companies now use electronic computers for payroll accounting. They may submit social security information and income tax payroll deductions to the Federal Government in magnetic tape form—if the information is produced by an IBM 705 Computer.

However, companies without this

to reduce construction expenses. Other economies are said to stem

and unobstructed surfaces are easily

equipment must convert their information into the IBM 705 format. the New computer-language translator does this easily. This means that any company employing electronic data processing techniques may now submit its payroll information on magnetic tape instead of on thousands of typed forms.

The translator unit quickly and accurately processes social security information for a payroll of 10,000 people into the IBM 705 input format in less than five minutes.

Repair 2200-ft Rip In Conveyor Belt

A 30-in. wide conveyor belt, 2200 ft long, valued at over $40,000, has been successfully repaired and returned to ore-conveying duty.

Used in a Mesabi range iron mine, this belt transfers ore from the bottom of the pit to the wash plant. A piece of tramp iron caused an end-to-end split in the belt. In the past the belt would have been scrapped and replaced at a sizeable investment to the company.

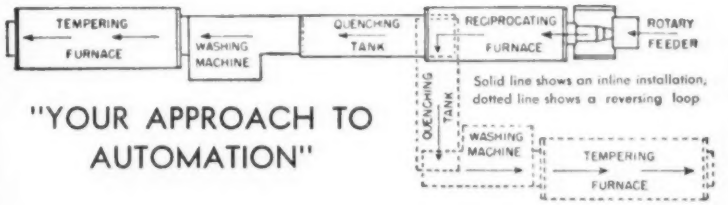
Conveyor Belt Service, Inc.'s modern plant at Virginia, Minn., restored the belt through specially developed methods that remove the damaged area, replace with new materials, re-vulcanize and cure. Thus the repaired belt has the same longitudinal and transverse strength as the original construction.

New Roof Beam Cuts Building Costs

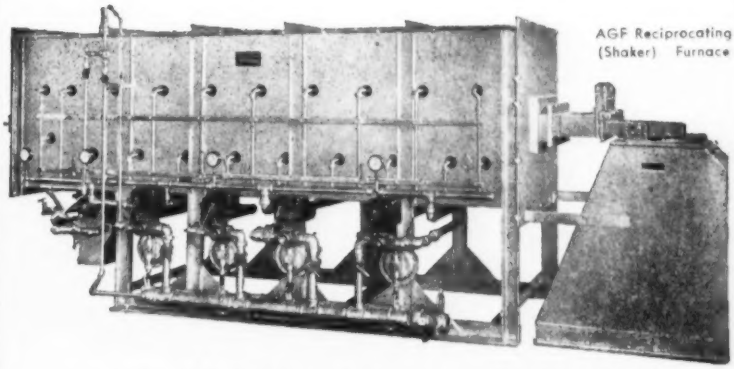
A new concept in building design —a slope-beam roof system—is said to offer substantial savings in labor and materials costs, plus unlimited design possibilities. Introduced by The Steelcraft Manufacturing Co., Cincinnati, the new system is designed for virtually every type of flat roof construction.

It is a complete framing-unit package which includes natural-slope steel beams and steel purlins to be used with most types of roof deck. The slope beam, a welded assembly of structural steel plates,

AGF Heat Treating Installation Cuts Costs



"YOUR APPROACH TO AUTOMATION"



AGF Reciprocating (Shaker) Furnace

A complete AGF Automatic Continuous Heat Treating Installation consists of an Automatic Rotary Feeder, a controlled Atmosphere Reciprocating Furnace (illustrated above) and an Automatic Quenching Tank followed by a washing machine and Tempering Furnace.

The output ranges from 100 to 800 lbs. of controlled atmosphere heat treating, quenching, washing and tempering per hour. A wide range of sizes cuts costs; the unit is suitable for a small plant or can be fitted into a production line in a large plant.

The installation can be made either in line or in a reversing loop as illustrated. The reversing loop discharges the work next to the charging end of the furnace and uses a minimum of floor space.

Each part is individually heat treated and quenched as it passes through the reciprocating furnace and quench tank. The disadvantages of batch processing are eliminated.

Flexibility permits handling small as well as large production lots on a continuous basis. Large production lots can be interrupted easily to run small batches of urgently needed work.

Ask AGF Engineers and Metallurgists to recommend the proper AUTOMATIC HEAT TREATING Equipment for your high production and low maintenance.

AGF factory trained representatives in principal industrial areas.

PLEASE MAIL COUPON

"PIONEER makers of heat treating and industrial gas equipment since 1878."

AMERICAN GAS FURNACE CO.

1004 LAFAYETTE ST., ELIZABETH 4, N. J.

Please send us your latest literature illustrating and describing AGF Rotary and Reciprocating Furnaces. Our application will be

Name ..... Title .....

Company .....

Street ..... City .....

Hourly Production ..... lbs. Product .....

in various standard lengths from 3 to 6 ft. The strip is composed of

through a standard I.B.M. punch-

ing, cleaning and annealing opera-

is designed and tested to conform to AISC standard codes of practice.

Offers Double Savings—Because lightweight slope beams require less steel than rolled sections for equivalent loads, they offer savings in both cost and weight. And since most steel erection is based on tonnage, the lightweight beams also claim to reduce construction expenses.

Other economies are said to stem from reduced wall height and elimination of heavier columns and foundations since a structure's dead load is reduced by the slope-beam construction.

Maintenance for this system is low. Fire resistant steel construction is not subject to attack by rot or vermin. The lower cubage reduces both initial cost and expense of heating and cooling. Flat and unobstructed surfaces are easily cleaned, painted and maintained.

Use Any Materials—A major advantage of the new roof system is its versatility. The beam-purlin portion can be used with a wide variety of metal roof decks. Moreover, the basic system grants complete freedom of treatment with wood, concrete, cement block, masonry and metal curtain wall.

The system can also be designed to meet unusual engineering or architectural requirements such as multiple spans, inverted positioning, longitudinal tilting, overhangs, and special loadings.

Other important advantages include faster delivery and erection. Beams are made individually or in quantity in accordance with customer requirements. Framing members are completely shop fabricated, reducing field work to a minimum. Sections can be erected quickly and accurately in all kinds of weather.

Beam lengths are not limited to a series of standards. They are available in a variety of sizes for spans from 25 to 60 feet, but they can be made to any length, at no increase in cost. Purlins are available in sizes 8 to 10 inches deep.

Magnetic Belt Prevents Part Damage

A major handling problem was recently overcome by Clevite Corp.'s Cleveland Graphite Bronze Div. in its manufacture of bushings and bearings.

The problem: How to secure these parts to a conveyor belt so that their close tolerances and mirror finish could not be marred by belt stops or inclines. The solution: Attaching sections of Eriez permanent magnetic Magna-Rail beneath the conveyor belt. The continuous magnetic field, acting through the belt, holds the individual pieces firmly until they are automatically released at the end of the conveyor line.

A product of Eriez Manufacturing Company, Erie, Pa., Magna-Rail is essentially a 4-in. wide strip,

FREEDOM'S HEARTBEAT...DEPENDS ON *Silicone*

Design engineers and materials specialists have come to recognize SILICONE as dependable and capable when extremely high and low temperatures are encountered.

STALWART engineers have come to know, however, that resistance to temperature is not enough. Through expert compounding by rubber chemists, STALWART has produced rubber parts capable of withstanding other deteriorating influences . . . abrasion, hot lubricating oils, compression. In addition, STALWART is capable of producing precision SILICONE parts by means of molding, extrusion, mandrelling and die-cutting.

STALWART engineers are specialists. If you have a temperature problem involving rubber, call on our engineers.

STALWART RUBBER COMPANY

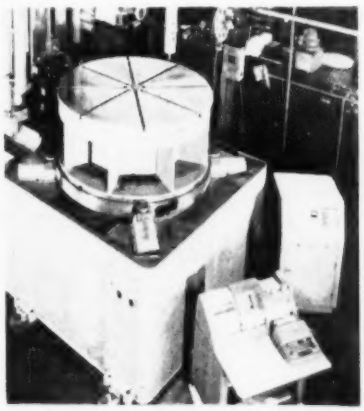
MANUFACTURING PLANTS IN BEDFORD, OHIO AND JASPER, GEORGIA. MAIN OFFICES AT 167 NORTHFIELD RD., BEDFORD, OHIO

in various standard lengths from 3 to 6 ft. The strip is composed of parallel pole plates to which are fixed a series of Alnico V non-electric magnetic elements.

The required components are easily and quickly installed on new or existing conveyors or elevators. No outside power is needed, maintenance is nil. The magnetic elements are guaranteed indefinitely by the manufacturers.

Single-Spindle Unit Drills Bolt Circle

A new vertical hydraulic-feed single-spindle drill press with a horizontal index table drills holes on circle diameters from 0 to 60 in. The machine was designed and built by Baker Bros., Inc., for a jet engine manufacturer. Spacing between



Punchcard units sets up automatic drilling of bolt circle.

bolt circles is variable. Machine control is either manual or fully automatic. The index table is electronically controlled with better than 300,000 positions from any starting point position. Any hole spacing around the circumference of the bolt circle can be obtained. The accuracy of index is within 0.002 in. measured on a 24-in. radius from the center of rotation. The outside diameter is 60 in. As no shot pins are used, the table is clamped in position by hydraulically operated pinch clamps. The work is clamped directly to the table and located so the center of the bolt circle is concentric with the table center. Automatic operation of the index is through a standard I.B.M. punchcard system.

Welds Coiled Strip

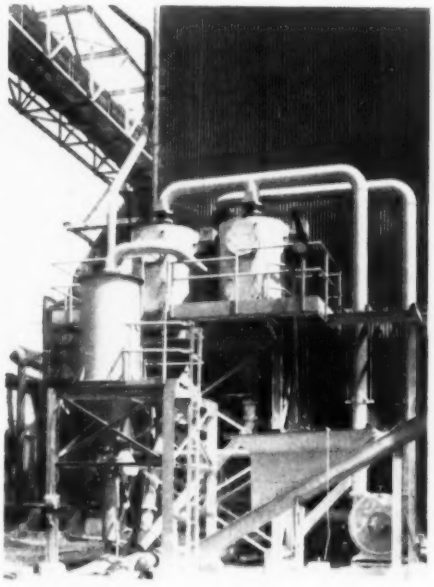
A resistance seam welder installed recently in a continuous annealing line welds strip steel up to 48 in. wide at a rate of from 24 to 72 fpm.

Dominion Foundries and Steel, Ltd., Hamilton, Ont., processes the low-carbon steel coils through welding, cleaning and annealing operations in the continuously moving line. Strip thickness ranges from 0.0067 to 0.035 in.

The welder, built by Taylor-Winfield Corp., Warren, O., is a travel head seam type that welds an overlap joint between succeeding coils. A special high-speed drive makes the weld quickly, while a reserve loop in the strip is being processed. This permits continuous line operation.

SPENCER VACUUM SYSTEM

handles both { CONVEYING and CLEANING ... at this Metals Plant



Pneumatic Conveying of lead, zinc and copper dust here is quick, dust-free and economical. Heavy material which settles out in breeching connecting the smelter to the Cottrell drops into hoppers. Once a day these hoppers are emptied by opening a slide gate valve. The accumulated heavy dust drops into a 6" Spencer vacuum line and is whisked back to the smelter.

General Plant Cleaning, carried on whenever system is not being used for conveying, is done with standard 1¾" and 2" Spencer hose and tool equipment. This bonus use of vacuum assures positive, dust-free sanitation.

Whatever **your** need in vacuum systems . . . for pneumatic conveying, cleaning, or **both** . . . it will pay to check with SPENCER —leader in developing systems to meet **individual** needs.

INSTALLATION DATA

Vacuum Producer: 60 H.P. Spencer

Conveying Capacity: 7½ Tons per hour

Primary Separator (1): 42" with 8 motor-driven rotary discharge valves

Secondary Separators (2): 50" bag type with motor-driven bag shakers, automatic sequence timers and solenoid-operated valves

Request these informative Bulletins:

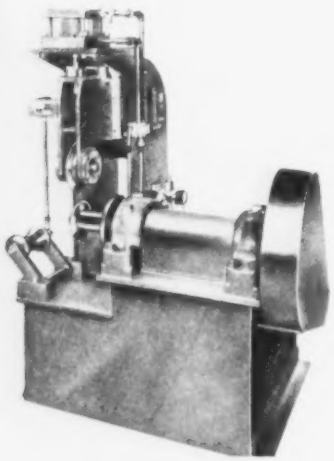
No. 143-B Spencer Pneumatic Conveying

No. 155-B Spencer Vacuum

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

New Production Ideas

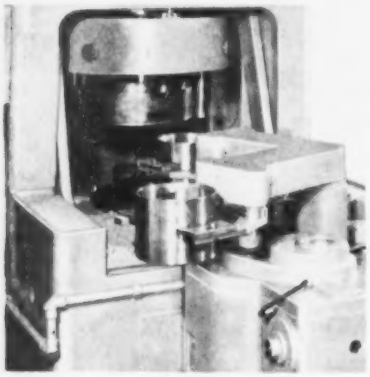
Equipment, Methods and Services



Setup Rapidly Slices Through Tube's Walls

Using two opposed, slightly offset cutting wheels, this cutoff machine rapidly slices through the wall thickness of metal tubes. Its double wheel cutting action leaves little burr. This allows proceeding to subsequent operations without deburring. The unit also solves the problem of tube collapse where especially thin wall tubing is cut in short lengths, from a fraction of an inch to 6-in. maximum length. Operation is basically the same as with a rotary shear; one wheel cuts from inside, the other from the outside. Capacity is 4½ to 8⅝ in. OD tubing, from light wall up to ¼-in. wall thickness. When in operation a large support roll permits easy feed to the stop. A powerful 8-in. bore air cylinder starts the wheel on its cutting cycle and lowers the support roll, allowing the tube to rest on the inner cutter. Roller and cutters automatically return at cycle end. (Continental Machine Co.)

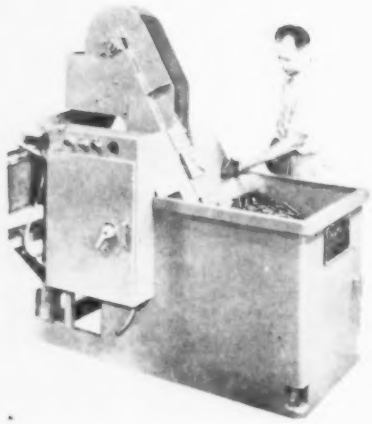
For more data circle No. 41 on postcard, p. 175



Load-Unload Unit Speeds Quenching Output

Attached to the front of a firm's quenching press a new automatic load and unload mechanism speeds production and reduces manual handling. It's timed in conjunction with the quenching cycle of the press. The two arms of the unit are positioned at 90° to each other. With cam control, one arm completes loading action, and the other simultaneously completes unloading. Because the time cycle from furnace to quenching press is uniform for each part, the unit insures control of quality. The quenching press accommodates round, flat, or irregular shaped parts up to 25-in. diam. Precision dies hold the parts during the quenching cycle to minimize distortion. (Gleason Works)

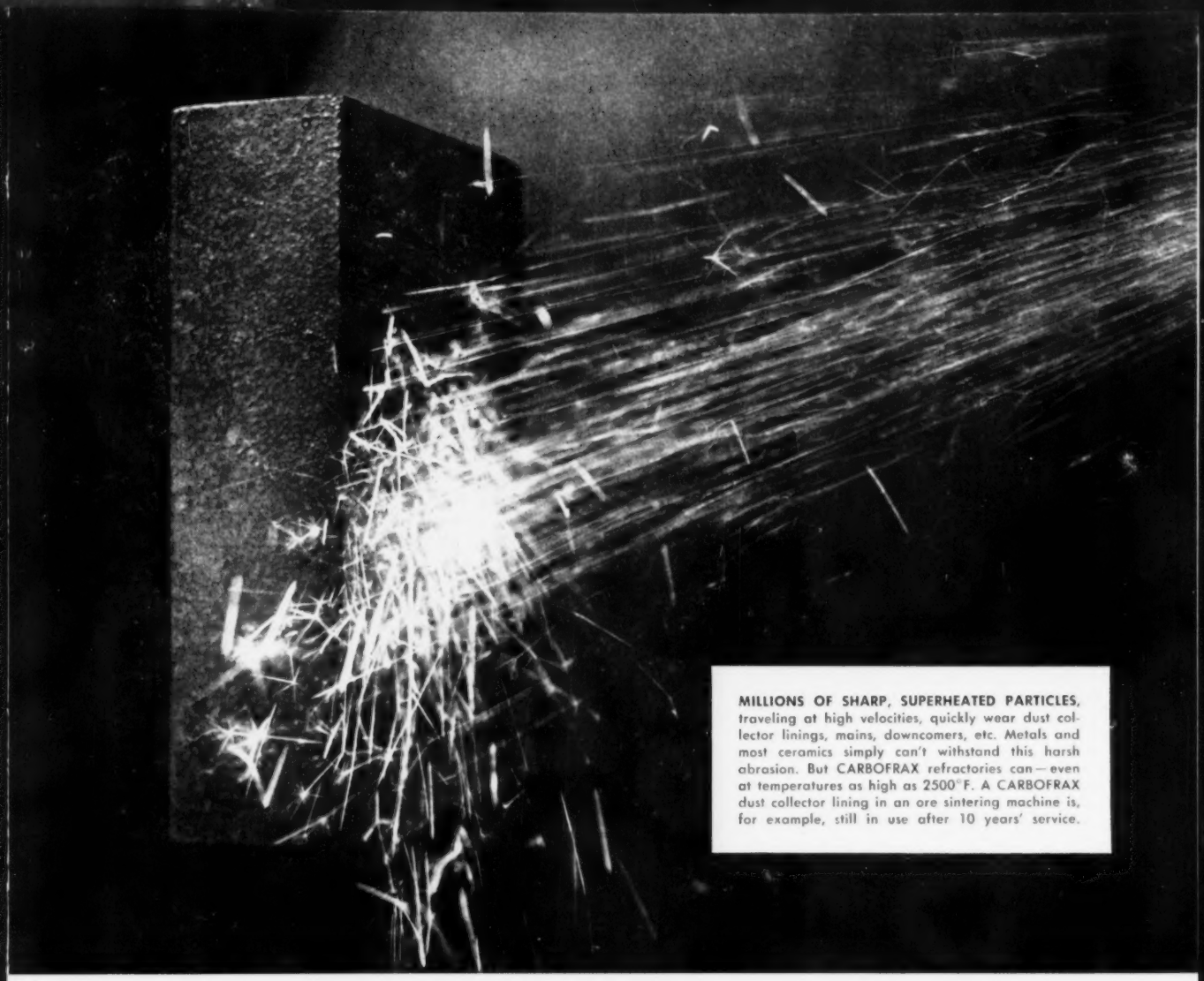
For more data circle No. 42 on postcard, p. 175



Unit Feeds Cast, Stamped or Machined Parts

Orienting storage feeders of 5, 10 and 20 cu ft storage capacity have been added to one maker's products. These new models store, elevate, orient and feed parts having over-all dimensions from ⅛ x ⅛ x ¼ in. to parts up to 3 x 6 x 10 in. Preceding models have storage capacities of 35 cu ft up for heavier parts. The unit readily orients and feeds irregular stamped, machined and cast components. A single feeder can feed a family of parts. Production rates range to 300 a minute. Of heavy steel plate, the storage elevator uses a hardened steel plate elevating chain. The drive is localized within the hopper base; it features variable speed drive, a foot-mounted standard motor, and an overload clutch. The unit propels parts by the natural frequency conveying method. Parts with soft surfaces are fed without harm. (Campbell Machines Co.)

For more data circle No. 43 on postcard, p. 175



MILLIONS OF SHARP, SUPERHEATED PARTICLES, traveling at high velocities, quickly wear dust collector linings, mains, downcomers, etc. Metals and most ceramics simply can't withstand this harsh abrasion. But CARBOFRAX refractories can—even at temperatures as high as 2500°F. A CARBOFRAX dust collector lining in an ore sintering machine is, for example, still in use after 10 years' service.

Refractories . . . to resist abrasion

Exceptional resistance to abrasion—whether caused by tiny gas-borne particles or sliding steel billets—is one of the most useful properties of several of Carborundum's unique refractory materials. For example, when used in the exhaust lines of gasoline catalytic cracking units in temperatures ranging up to 1200°F, these refractories lasted 3 years, as compared to alloy rings which lasted for 6 months.

And when abrasion is combined with higher temperature, the exceptional resistance of these super refractories becomes even more apparent and useful. As skid rails in furnaces which heat 6-lb. billets to 2250°F—pushing 250 slugs an hour—CARBOFRAX® silicon carbide refractories need one-third the replacement, one-third the labor and one-third the down-time of ordinary rammed chrome ore hearths. Other successful applications include: dust collectors, gas scrubbers, transfer pipe lines, hydro cyclones and process equipment parts, to name but a few.

Many applications call for other properties in combination with wear resistance. Among Carborundum's many materials are refractories that also offer excellent heat shock resistance with sufficient hot strength to withstand 25 psi at 3128°F. Others provide unique resistance to corrosion as well as abrasion. These properties are but a few of those to be found in super refractories pioneered by Carborundum. Among them, you are almost certain to find answers to your refractory and high-temperature problems. For help, fill in and mail this coupon:

CARBORUNDUM
Registered Trade Mark

----------MAIL THIS COUPON TODAY----------

Dept. B117, Refractories Division,
The Carborundum Company, Perth Amboy, N. J.

Please send me:

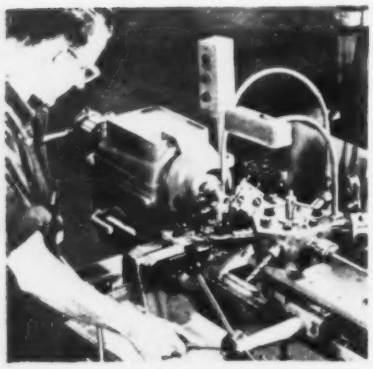
- ☐ Forthcoming issue of Refractories Magazine
- ☐ Bulletin on Properties of Carborundum's Super Refractories
- ☐ Here is a description of my high temperature problem. Can you help me?

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____



Hand Screw Machine Takes Over Short-Run Work

Designed to cut costs where manufacturers are faced with short production runs of 50, 500, or 1000 pieces, the new machine combines the time and cost-saving features of rapid chucking and multiple tooling with low initial investment and low operating costs. There's minimum setup and changeover time. Space requirements are small. The bed turret with six stations for up to six operations moves quickly from one operation to the next with a simple turn of the pilot wheel. The work piece is chucked in a fraction of a second by a touch on a lever. A new double tool-post slide features a pilot wheel feed. It combines rapid slide movement with a full 8-in. travel. (Delta Power Tool Div., Rockwell Mfg. Co.)

For more data circle No. 44 on postcard, p. 175

Hydraulic Slotter Features Rotary Tracing

Capable of both conventional slotting and complicated tracer work, a new 20-in. hydraulic slotter features quick-change from standard work to tracer work and vice-versa. A transverse movement of the slotter table makes rotary or straight work possible. Equipped with a highly sensitive tracer duplicator, the new slotter produces its own working templates from a toolroom master, or from a finished workpiece. The fulcrum drive to the ram is hydraulically powered, with pendant-controlled cutting speed. Hydraulic power is used for feeding and rapid traverse in all directions. Stroke length can be adjusted while the ram is in motion. (Rockford Machine Tool Co.)

For more data circle No. 45 on postcard, p. 175

Clothing, Aprons Resist Abrasion, Chemicals

Lightweight and flexible, a new line of controlled polyvinyl chloride-impregnated clothing and aprons resists chemicals and abrasion. Made with a fabric base coated on both sides with specially formulated plastic, the clothing resists chemicals and solvents of virtually every type. Tests indicate that welded buttons have extremely high strength. The tough polyvinyl chloride coating not only resists abrasion but it's difficult to puncture. It won't crack, peel or get tacky. (Jomac, Inc.)

For more data circle No. 46 on postcard, p. 175

Ultrasonic Set Speeds Cleaning, Degreasing

For pilot plant or production setups, this ultrasonic cleaning generator simplifies manual or conveyorized cleaning and degreasing. It removes insoluble soils and contaminants faster than some other methods. Even oil is sintered parts, blind holes, and complicated crevices washes out easily. In fact, as long as a surface is in contact with the cleaning liquid, cleaning takes place. The 25 x 17 x 19-in. high generator weighs 175 lb. It has an average power output of 1 kw with a peak on pulses of 4 kw and plugs into all standard industrial receptacles. Housed in a gray hammertone aluminum cabinet, it uses a simple one-tube pulsed oscillator, a cooling fan to insure long, trouble-free operation. (Branson Ultrasonic Corp.)

For more data circle No. 47 on postcard, p. 175

MACHINING PERFECTION always starts with the right steel

Pick exactly the right steel for any job from J & L's complete cold finished line

"Machines window pivot pins 35% faster with J & L C-1117 leaded steel"

Conversion to J&L "C-1117" leaded steel from regular "C-1117" steel cut total machining time 35% for this pivot pin used in linkage for turning quarter windows. Cycle time was cut from 3.5 to 2.6 seconds for this part machined from ⅜" cold finished round. J&L leaded steels give you higher cutting speeds, longer tool life, improved finish. Call your local distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J&L STEEL

Jones & Laughlin

. . . a great name in steel

Don't let delays cost you... call in your

CF&I WIRE CLOTH SALESMAN

If you're like most wire cloth fabricators or users, delays in your normal supply channels can cost you money—even cause you to lose out on important hurry-up jobs. You can't afford the days it sometimes takes a wire cloth salesman to get to your desk from his distant office. Nor can you afford hours or days while he gets quotations from his mill.

When you deal with a CF&I Wire Cloth Salesman, such costly delays are eliminated. Here's how:

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2. **Your CF&I Salesman can give you immediate price quotations.** From his complete, up-to-date book he can quote prices on any combination of specifications. CF&I Industrial Wire Cloth is available in 200 mesh and coarser, in many metals and weaves.

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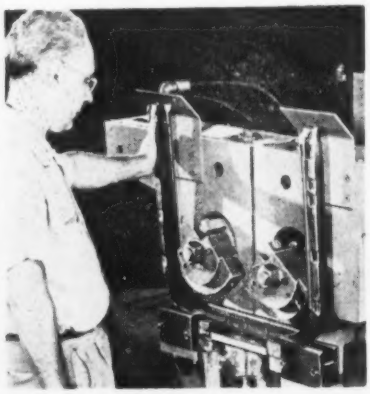
I5500

NEW EQUIPMENT

High-Speed Bender

Smooth high-speed bending with easy loading and unloading is the feature of a new bender developed for the automotive industry. For



a U-shaped radiator support channel with two 90° bends on a 3¾-in. radius, production is at a rate of 1000 bends per hour. The vertical design facilitates material handling. Bronze ways supporting the wiper shoes have all but eliminated galling. It reduces maintenance and gives long die life without special lubrication. (Pines Engineering Co.)

For more data circle No. 48 on postcard, p. 175

Time Recorder

Due to advanced engineering and design, this attractive modern time recorder helps management control run-away payroll costs. It provides accurate, indisputable records of

wages paid for hours worked as required by this statute. The newly designed modern time recorder is

housed in a compact, sturdily constructed metal case, which appeals to many firms operating in limited quarters today. It operates from any desk top or can be wall-mounted. Automatic and designed to insure many years of precise, trouble-free performance, the unit is available with synchronous motor drive for an alternating current circuit, or for a master clock operation. (Cincinnati Time Recorder Co.)

For more data circle No. 49 on postcard, p. 175

Wear-Resistant Filler

A new wear-resistant, self-lubricating material has been used successfully for such applications as guides on textile machinery, low speed bearings, building up surfaces subject to severe wear, making duplicating masters and forming dies.

Because of its excellent resistance to most acids, alkalies, solvents and other chemicals, it has proved of great value for lining tanks and repairing chemical equipment. Supplied in paste form, it becomes a syrupy liquid upon the addition of a hardening agent. It can be cast or poured in a variety of shapes. Only two hours after the addition of the hardening agent, the material becomes so tough that it cannot be machined except with carbide or similar tools. Tests show that the material outwears steel 60 to 1. (Devcon Corp.)

For more data circle No. 50 on postcard, p. 175

Limit Switches

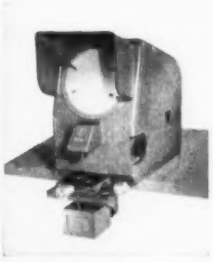
With high electrical capacities, a pair of new two-circuit limit switches are compact in size. The roller-plunger switch which is es-

PRECISION PRODUCTION PROBLEMS ?

Here's help from Bausch & Lomb in TOOL DESIGN INSPECTION FABRICATION MEASURING TESTING

NEW! ALIGNMENT INTERFEROMETER

Accurately measures small changes in angle over a range of 30 seconds of arc (+15 seconds). Easy direct scale readings to 0.2 seconds (0.000006").

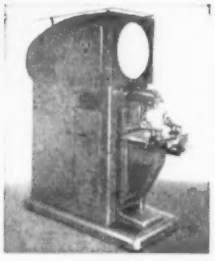


BENCH COMPARATOR

Exclusive understage illumination—no complex set-ups, no holding fixtures for most work. Magnified silhouettes show errors instantly. Reads to 0.0001" with optional micrometer stage.

STEREO-MICROSCOPES

Magnified 3-D views of tiny parts. Dustproof, shockproof, can be mounted right in machine or fixture. Speeds assembly, inspection. Most complete line, widest field of view.

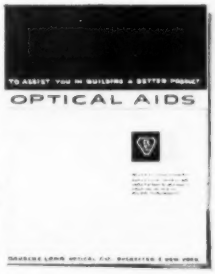


CONTOUR MEASURING PROJECTOR

Shows magnified silhouettes or surface views. Simple operation, highest precision measurements: to 0.0001", linear; to 1 minute of arc, angular.

OPTICAL AIDS CATALOG

Time-and-money-saving data on Surface Comparators, Industrial Magnifiers, Macroscopes, Microscope Bodies, Micrometer Discs, Wide Field Tubes, Brinell Microscopes, Shop Microscopes.



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Quickly measures opaque or transparent objects of any contour. Linear, accurate to 0.0001"; angular, to 1 minute of arc.

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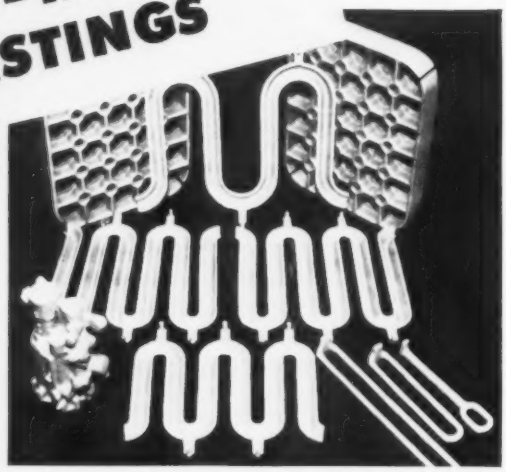
SHELL - MOLDED CASTINGS



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We are now in position to accept and process substantial orders for shell-molded castings in the Chrome Iron, Chrome Nickel class.

Shell-molded castings provide several values over conventional castings:

a . . . dimensions are exceptionally accurate
b . . . thinner walls are practicable
c . . . surface finish is superior

Shell-molding is ideal for mass or repetitive production of parts particularly those with intricate design.

With our conventional static and centrifugal casting service now broadened by our shell-molded casting service, we are in a better position than ever to serve industry in connection with its high alloy casting requirements. May we quote on your casting requirements that call for shell-molding?

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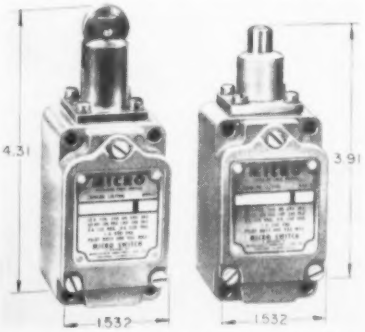
pecially effective for cam or slide operations, can be rotated 90 degrees from the switch cover plate. The plunger-actuated switch offers a full ¼ inch of overtravel. Both are completely sealed and highly resistant to abuse and wear. The contact arrangements are double-throw two-circuit or single-pole



double-break. A single-pole double-throw unit can be obtained by tying together one normally-open and one normally-closed terminal and using this as a common terminal. (Micro Switch Div., Minneapolis - Honeywell Regulator Co.)

For more data circle No. 51 on postcard, p. 175

Scope for Metallurgy

Expressly designed for the metallurgist, a new microscope features a circular stage for rapid, precise specimen positioning under the objective in any horizontal direction. Four interchangeable, rotatable (to

full 360°), inclined bodies are available: monocular, binocular, trinocular and special monocular photographic. A low - cost accessory 35mm camera can be easily

mounted. The vertical illuminator provides 6.5-volt, 2.75-amp light source, controllable by aperture and field diaphragms. Combinations of eyepieces and short-mount achromatic coated objectives can be selected to provide any desired series of resultant magnifications. (American Optical Co.)

For more data circle No. 52 on postcard, p. 175

Hydraulic Pump Unit

A new hydraulic power and pump package unit operates high pressure hydraulic equipment. It adapts to varying requirements in the range from 4.1 gpm at 5000

psi to 3 gpm delivery at 8800 psi. An externally located valve adjusts pressure in the field. The belt driven, six-piston pump unit provides quiet and smooth fluid delivery. An internal safety relief valve is factory set at 9000 psi for tool protection. (Manco Mfg. Co.)

For more data circle No. 53 on postcard, p. 175

Furnace For 3000°F

Featuring silicon-carbide heating elements, this electric furnace operates at high temperatures. It's designed for operation to 3000°F flash heats in oxidizing or neutral atmospheres. At 2850°F it offers continuous operation in oxidizing or neutral atmospheres. In reducing atmospheres, it works at 2500°F. Suitable for laboratory or production use, the furnace will fire ceramics, cermets, do metallic oxide work, heat-treat metals or accommodate sintering processes. Actually, it has many applications in high-temperature jobs in either oxidizing, reducing or neutral atmospheres. The unit has a firing

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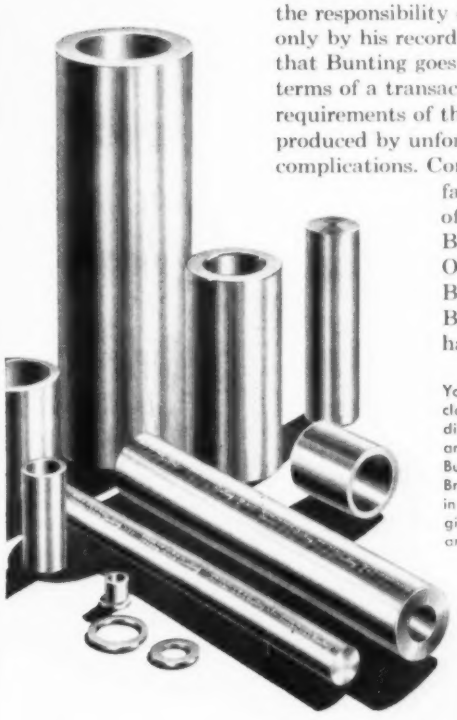

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Monorail Hoist

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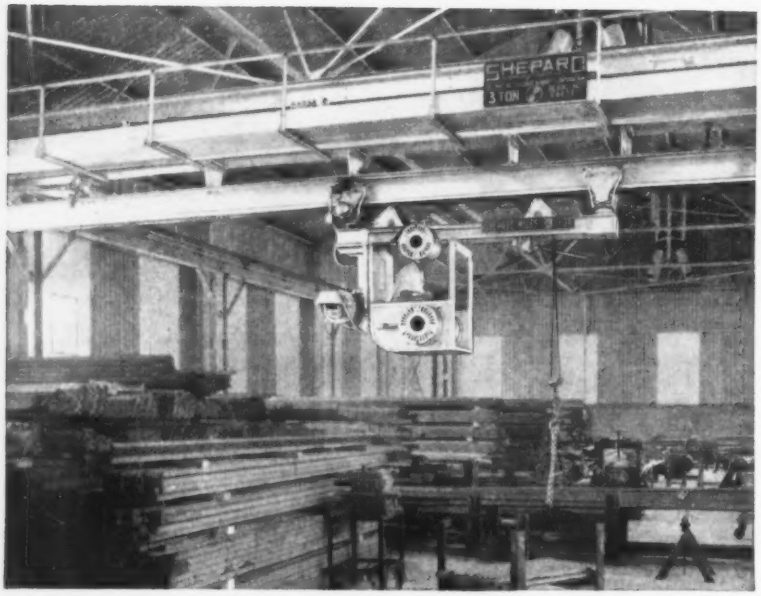
...by the most direct route



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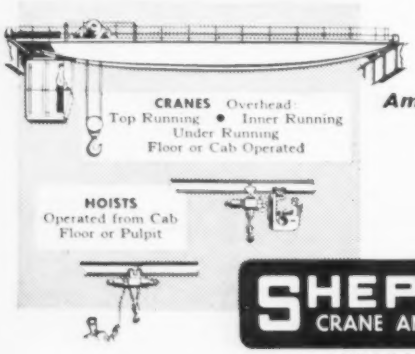
Let us show you the complete line of Shepard Niles hoists available for constant or intermittent service. Choose from light, medium or heavy duty hoists, equipped with either cab or floor controls. Offered in fast, medium or slow speeds.



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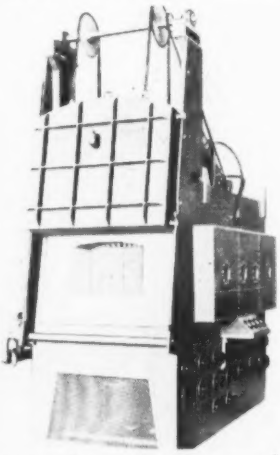
chamber 18 in. wide x 12 high x 160 long. Insulation is multi-layered and the primary insulating brick can operate at 3200°F. Furnace interior and all door and door seal surfaces

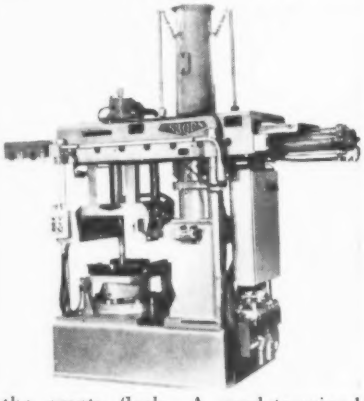


are covered coated with a very hard, tightly adherent alumina surface. The hearth is also of alumina. (L & L Mfg. Co.)

For more data circle No. 54 on postcard, p. 175

Molding Machine

This "blow-squeeze-strip" molding machine is the newest addition to one firm's automated foundry equipment. On this new molding machine the operator simply loads

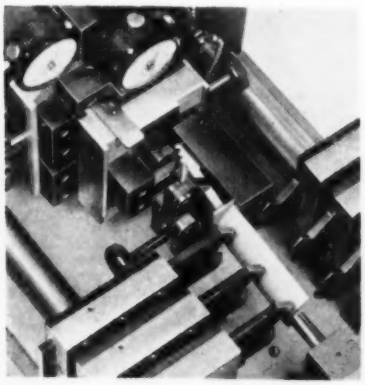


the empty flask. A predetermined volume of sand is blown into a preformed cavity and squeezed into the flask. The pattern is then stripped from the mold. Operating on a preset time cycle, this operation provides quality control of mold density and casting finish. An added advantage is the negligible amount

of sand spillage. (Osborn Mfg. Co.)
For more data circle No. 55 on postcard, p. 175

Precision Gage

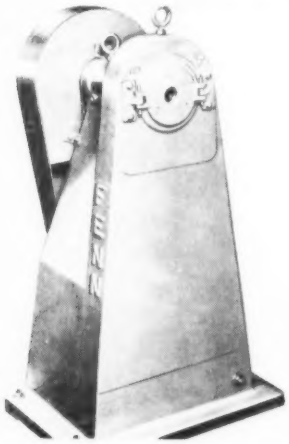
For checking accuracy of jet engine blades, a new universal precision gage features airfoil template holders, adjustably mounted on hardened and ground ways. The



template holders are positioned by interchangeable master gage bars. Blades of any length can be checked while maintaining template alignment accuracy of 0.0002-in. (Shepard & Young Tool Co.)
For more data circle No. 56 on postcard, p. 175

Swaging Machine

This swaging machine is designed to replace the manufacturer's earlier models. Improvements over the past



swaging units are several. They include a one-piece cast frame that provides rigidity, good alignment and freedom from vibration. It also features a heavier drive. Motor and electrical parts are mounted within the frame. (The Fenn Mfg. Co.)
For more data circle No. 57 on postcard, p. 175

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STEEL MEN!

Corhart melting-end bridgewall, in tank described below, after 21 months and 6 days of service . . .

WHAT IS A "CORHART BALANCED FURNACE"?

THE term "Corhart Balanced Unit" does not signify a new or unusual design of glass furnace. It is used to describe *your* furnace, just as it stands, except with the more vulnerable parts *fortified* with Corhart Electrocast to that point where *all* parts of the tank—from dog-house to bottom—wear out evenly, each part delivering its full potential of life and service.

The cost of Corhart Electrocast is higher *per ton* of blocks, but analyses of cost and results in many units prove beyond question that it is by far the most economical refractory *per ton of glass produced*. Glass factory profits are determined by the cost of *finished ware* and NOT by the cost of the tank blocks.

The following is a typical example of many actual records:

	CORHART BALANCED TANK	CLAY TANK (AVE. OF 5 FIRES)
Cost, labor and materials	$11,100.00	$8,000.00
Life (days)	648	289
Tons of glass produced	22,087	7,274
Tank cost per day	$17.12	$27.70
Tank cost per ton of glass produced	$0.503	$1.10
Melting area	18 x 32	18 x 32

With the outlook for large tonnage demand and the desirability of continuous operation, such economies as these cannot long be ignored. Corhart Electrocast is the answer to the crying demand for a better glass furnace construction material. Write today for further information and proof of economy. *Address:* Corhart Refractories Co., *Incorporated*, 16th & Lee Sts., Louisville, Ky.

CORHART ELECTROCAST REFRACTORIES

HERE'S an ad of ours that appeared 24 years ago, back when only a few of the most progressive glass manufacturers would use Corhart Electrocast Refractory —"one of the world's highest-priced refractories". Today, however, Corhart Electrocast Refractories are used extensively throughout the world . . .

In 1957, Corhart 104 is still relatively new in the steel industry. It is also "one of the world's highest-priced refractories". Yet it offers open-hearth furnace operators the same opportunities for greater production and lower costs that Corhart Electrocast brought to glass manufacturers.

May we tell you the whole Corhart 104 story? Address: Corhart Refractories Co., *Incorporated*, 1638 West Lee Street, Louisville 10, Kentucky, U.S.A. SPring 8-4471.

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The Iron Age Summary

Steel Hits Year-end Doldrums

Market still lacks much-needed shot-in-the-arm. Inventory cutbacks continue.

Mills themselves have begun to cut back on heavy stocks of semi-finished and finished steel.

■ The steel market is settling down to a year-end lethargy. In the absence of a significant upturn in demand from major steel users, steel output appears to be heading into a gradual downturn.

Automotive and other industries are using more steel than they are buying. That's one reason why the steel production rate has been easing off.

Automotive Strike Hedge?—Automotive buying is not likely to inject any zip into the steel market until some time in the first quarter of 1958. At that time, observers expect automakers to start building up stocks of new cars as a hedge against the possibility of a strike by auto labor.

Still, the steel market is not so gloomy as it appears. For one thing, inventories in the hands of steel users are relatively low. But the rate of consumption in users' plants is holding to a fairly high pace. Manufacturers' order backlogs are still heavy.

Strong Points — Other factors likely to support steel in the months ahead include: The highway building program is beginning to gather momentum, the backlog of freight car orders, shipbuilding activity, and linepipe projects.

No one knows as yet how much of a shot-in-the-arm stepped up military production will give to steel. But the trend in military spending is up. The probability is that defense spending will move up to a $41 to $42 billion rate in the near future.

Steel Men Uncertain—The "iffy" outlook in steel is reflected in the comments of leading steel men contacted by The IRON AGE last week.

Said one executive: "Some of the bigger firms may find things a little tougher next year but flat-rolled steelmakers have been at bottom for the past few months. We look for a better sheet market in 1958; it could hardly get much worse."

Mills Cut Inventories—Said another: "While things look a little sour for 1958 compared with boom times there are so many 'ifs' and 'buts', including defense spending and international events that it would be silly to either predict 110 million tons next year or 117 million tons. Our feeling is that there is a 50-50 chance that 114 or 115 million tons will be made next year."

Steel mills themselves are beginning to pare their inventories. It's estimated the mills have built up about a million tons of semi-finished and finished steel. They've now begun to work off some of this excess in order to improve their cash position for year-end financial statements.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week 1,996	Last Week 1,996	Month Ago 2,074	Year Ago 2,474
Ingot Index (1947-1949=100)	124.3	124.3	129.1	154.0
Operating Rates				
Chicago	78.0	78.5*	81.0	109.5
Pittsburgh	81.0	81.0*	80.0	97.0
Philadelphia	85.0	87.0	82.0	103.0
Valley	65.0	64.0*	67.5	99.0
West	80.0	80.0	93.5	100.0
Buffalo	80.5	99.0	97.5	105.0
Cleveland	80.0	85.0	89.0	102.5
Detroit	92.0	92.0*	96.0	106.0
S. Ohio River	85.0	84.0*	87.5	99.0
South	60.5	67.0	73.0	96.0
Upper Ohio R.	71.0	74.5*	79.5	103.0
St. Louis	90.0	91.0	95.0	107.0
Northeast	40.0	40.0	40.0	100.0
Aggregate	78.0	78.0	81.0	100.5

*Revised

Prices At a Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.967	5.967	5.967	5.622
Pig Iron (Gross ton)	$66.42	$66.42	$66.42	$63.04
Scrap, No. 1 hvy (Gross ton)	$33.00	$33.33	$37.33	$61.17
No. 2 bundles	$24.67	$25.00	$27.67	$48.50
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	27.10
Copper, electrolytic	27.00	27.00	27.00	40.00
Lead, St. Louis	13.30	13.30	13.30	15.80
Magnesium Ingot	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	64.50
Tin Straits, N. Y.	89.50	89.625	91.875	107.00
Zinc, E. St. Louis	10.00	10.00	10.00	13.50

Plating Equipment Demand Down

Makers of plating and anodizing machines are getting ready for a buyers' market during the next six months.

Trend in equipment is toward more efficient, fully automated units.

▪ Plating and anodizing equipment makers are girding for a buyers' market in the next 6 months. Demand for plating equipment is down; for anodizing equipment up —but the total is less than normal and will be so at least until second quarter of 1958.

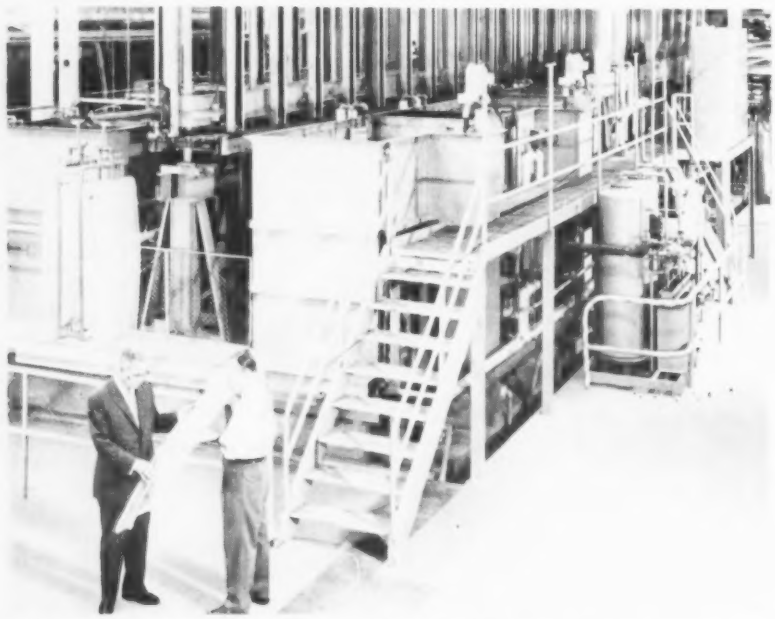
Lack of customer demand has shrunk order backlogs, but these are expected to rise over the next 4 or 5 months, reaching peaks by the end of the first quarter. Equipment makers are not alarmed for this is a seasonal trend occurring almost every fourth quarter.

Automotive Influence — Detroit is the major reason for the cycle. Automakers place heavy orders in the first quarter each year, with delivery scheduled for late summer. As a result, the industry normally has a high backlog in first quarter which tapers off during the summer, then starts up during the last period. This makes for the current buyers' market, with the emphasis on versatility, simplicity of operation, and cost—both initial and operating.

But the future looks bright. Auto sales are generally expected to be better in '58 than '57, and appliances — No. 2 customer — should also revive during the winter. Curiously, Detroit retrenchment can benefit plating equipment suppliers. Automaking economy means a swing to in-plant plating facilities. This in turn requires purchase by automotive platers of heavy equipment to do the job. And, overall, equipment makers are confident that engineering work in the past year will bring important advances in the next few months.

Automation Stressed—Big trend is toward more efficient, automated equipment. Plating equipment is now becoming fully automated. In the past, so-called automatic plating machines only cycled the parts through the various plating steps. As a result, parts piled up at both ends of the machine. Now, automatic load-unload devices are integrated with the plant monorail system, permit a steady flow of work to and from any plating or anodizing installation.

Deliveries Normal — Equipment availability is good, with raw materials ample. Both electric and hydraulic controls for automatic units are presently somewhat tight, but have caused no serious delays. And the industry hopes this will clear up in '58. Since plating equipment is generally custom produced, present delivery time of 3 to 5 months is about normal. Buyers should allow another 3 months for installation. Engineering talent to design, produce and install the equipment is plentiful, and all companies are pushing increased technical know-how of engineering personnel to further reduce deliveries and installations.



COLORFUL PRODUCER: Color-anodized aluminum grills are turned out by this large, heavy-duty Hanson-Van Winkle-Munning anodizing machine installed at the Akron, O. plant of Firestone Steel Products Co.

Prices

Price of Itabira lump iron ore for 1958 will be the same as in 1957, namely $14.60 per gross ton, the producers—Cia Vale do Rio Doce Co. of Brazil — have announced through their American representative, the Cleveland Cliffs Iron Co.

Facts to consider when you're buying

Chromate Conversion Coatings

for Corrosion Protection, Paint Base, Decorative Finishing

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a nonporous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

If your company is manufacturing or buying parts or complete assemblies made from or plated with any of the more common non-ferrous metals—zinc, cadmium, aluminum, magnesium, silver, copper, brass or bronze—you've probably already run up against the question of finishing these surfaces with a chromate conversion coating. These coatings are used to protect against corrosion, or to provide a base for paint or to provide a decorative finish for sales appeal or shelf life. Since chromate conversion coatings represent a relatively new means of obtaining these finishes, this digest of facts to consider may be of value to you.

1. THE COATINGS THEMSELVES. There are many brands on the market. All are similar in many ways. Each, of course, offers its own specific advantages and these may relate to operating techniques, performance under actual use conditions, cost, availability, etc. Naturally, you'll want to choose a coating that is widely known and accepted under both military and civilian specifications.

2. THE COMPANY BEHIND THE PRODUCT. Is it a reliable, established organization? Does it offer experienced technical service, both from the field-engineering organization as well as the home office and laboratories? The man who sells and services your installation should be thoroughly familiar with not only chromate conversion coatings and their applications, but also with the characteristics and performance of related finishing operations such as precleaning, electroplating, painting, etc. This is most important since all steps of the finishing cycle must be functioning properly for the satisfactory performance of the ultimate finish produced.

3. AVAILABILITY OF THE PRODUCT. Ideally, of course, the material should be readily available to you from nearby warehouses to avoid time loss in long distance shipping and to provide emergency service, should the need arise.

4. COST. Naturally, the initial price of the material is important to you. However, just as you consider ultimate cost when you are buying mechanical equipment, ultimate cost must be considered for these finishing chemicals. So, it will pay you to investigate consumption costs, labor costs and the other factors which go into the determination of ultimate cost. Further, cost alone gives no indication of product performance, so careful attention must be given to the purpose the finish must serve and the value that finish will add to your product.

5. FACILITIES FOR RESEARCH AND DEVELOPMENT. Perhaps the existing types of chromate conversion coatings do not include a compound that will accomplish exactly what you wish. Then, it is important to deal with a supplier who has adequate research and development facilities available to work with you to produce a material to meet your needs. Naturally, such a project is seldom completed overnight. But, with complete cooperation and confidence from both you and your supplier, chances are a satisfactory program can be completed.

These are the concepts of sales and service on which we, Allied Research Products, Incorporated, have developed and marketed the line of Iridite chromate conversion coatings . . . superior product performance, complete sales and technical service, easy product availability, economical cost, extensive research and development facilities. No doubt you are familiar with our line and have seen this trademark—

IRIDITE®

—in our advertising, technical literature or on shipping containers in your plant. Remember this trademark when you're buying or investigating chromate conversion coatings for your company. It's your assurance of quality, economical products from a reliable and established company, skilled sales and technical service from both our home office and a national network of representatives, immediate availability from warehouses in strategic industrial areas and our willingness to work with you to develop new finishes to meet your needs, should the present line fall short.

For complete information on Iridite chromate conversion coatings, write today for your free copy of our technical data file. Or, for immediate advice, call in your Allied Field Engineer. He's listed under "Plating Supplies" in your classified telephone book.

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STEEL PRODUCT MARKETS

Sellers Move Fast To Get Orders

Steel mills guarantee deliveries in days or even hours to make sales.

Quotas are growing more flexible on sheared mill plate and disappearing entirely on wide flange beams.

■ "When can we get it?" continues the top question for both steel buyers and sellers.

Customers—realizing they are in the driver's seat—are requiring producers to turn on a dime in getting out orders. Sometimes a mill is told the delivery promises of competitors and asked to meet them or else.

As a result, steel suppliers are moving fast to nail down business. Producers boast of making shipments in 24 or 48 hours. Warehouses are often delivering in a few hours.

Pressure On Mills—Steel salesmen—prodded by their customers are themselves prodding production personnel with "when can we get it?" And there are gripes if the millmen can't meet the buyer's delivery requests.

While most of the hustle is for the small tonnage customer, even larger consumers like the auto manufacturers are caught up in the race against the calendar. Once Detroit sets auto tonnages for the month, steel salesmen start to ride herd on local auto plants for order releases. Sometimes they're on the phone even before the local plants themselves get the word from Detroit.

Sheet and Strip—Fast deliveries are the big factor in getting orders. Aside from automotive and appliance customers who are generally blocking out tonnages a month or so ahead, most users are insisting on rapid, last-minute deliveries. On the warehouse level, deliveries are often in terms of hours. Some mills are getting orders by filling requests in a day or two. In many cases producers are using stocks of hot bands for fast rolling into cold-rolled sheets. Overall sheet consumption continues in a steady volume.

Plates — While sheared mill heavy plate is still a quota item at many mills, it might really be listed as a "quota plus" product. Reasons: Customers are often asked how much they want, rather than told how much they can get. In addition there's evidence that mill books are opening to accommodate new customers. **Eastern** shipyard buyers are now shaking free of allotment restrictions and able to do some shopping around for their tonnages.

Light Plate—Producers still find this a good product to fill out slack rolling schedules at sheet mills and they are taking all the tonnage they can get. However, while there's still demand for continuous mill plate, it is easing to a considerable degree. Deliveries are running about 3-6 weeks on the product.

Shapes—Market strength of this product is ebbing. A large **Eastern** producer of wide flange beams is scrapping customer allocations beginning with December orders. Another producer in the area has resumed operations at its standard structural mill following a two-month shutdown. There's little optimism about the structural market on the **West Coast** where a steel sales manager reports: "We'll deliver anything you want when you want it . . . Our toughest job is changing our thinking from an allocation market to a wide-open market."

Tinplate—Mill inventories continue to grow despite production cutbacks. The main reason is that fourth quarter orders by canmakers have dropped more than seasonally expected. A portion of the tinplate ordered for the third quarter has not been shipped. The mills will probably need to carry it over into next year.

Pipe and Tubing—Seamless pipe ordering is off mainly due to a large inventory buildup among customers. One oil producer is described as having nine months worth of inventory on some seamless items. With no upturn in drilling activity foreseen during 1958 further easing in demand seems likely. A few isolated loopholes in delivery schedules for one of the tightest products — large diameter welded pipe—are appearing. While mills are generally booked almost solid into 1960 and 1961, a pile-up in construction projects awaiting ICC approval is causing some setbacks in deliveries.

Bars—While there are a relatively large volume of orders most of them are for small tonnages. Cutbacks in railroad car building are hurting the bar market.

PURCHASING AGENT'S CHECKLIST

Gauging effect of the Sputnik era on business. **P. 118**

Imports and northern competition are causing trouble for Southern steelmakers. **P. 121**

Sales of imported machine tools are climbing sharply. **P. 139**

COMPARISON OF PRICES

(Effective Nov. 12, 1957)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in **Heavy Type**; declines appear in *Italics*.

	Nov. 12 1957	Nov. 5 1957	Oct. 15 1957	Nov. 13 1956
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.925c	4.925c	4.925c	4.675c
Cold-rolled sheets	6.05	6.05	6.05	5.75
Galvanized sheets (10 ga.)	6.60	6.60	6.60	6.30
Hot-rolled strip	4.925	4.925	4.925	4.675
Cold-rolled strip	7.17	7.17	7.17	6.870
Plate	5.12	5.12	5.12	4.87
Plates, wrought iron	13.15	13.15	13.15	10.40
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	47.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.30	$10.30	$10.30	$9.95
Tin plates, electro (0.50 lb.)	9.00	9.00	9.00	8.65
Special coated mfg. ternes	9.55	9.55	9.55	9.20
Bars and Shapes: (per pound)				
Merchant bar	5.425c	5.425c	5.425c	5.075c
Cold finished bars	7.30	7.30	7.30	6.85
Alloy bars	6.475	6.475	6.475	6.125
Structural shapes	5.275	5.275	5.275	5.00
Stainless bars (No. 302)	45.00	45.00	45.00	40.75
Wrought iron bars	14.45	14.45	14.45	11.50
Wire: (per pound)				
Bright wire	7.65c	7.65c	7.65c	7.20c
Rails: (per 100 lb.)				
Heavy rails	$5.525	$5.525	$5.525	$5.075
Light rails	6.50	6.50	6.50	6.00
Semifinished Steel: (per net ton)				
Rerolling billets	$77.50	$77.50	$77.50	$74.00
Slabs, rerolling	77.50	77.50	77.50	74.00
Forging billets	96.00	96.00	96.00	91.50
Alloy blooms, billets, slabs	114.00	114.00	114.00	107.00
Wire Rod and Skelp: (per pound)				
Wire rods	6.15c	6.15c	6.15c	5.80c
Skelp	4.875	4.875	4.875	4.225
Finished Steel Composite: (per pound)				
Base price	5.967c	5.967c	5.967c	5.622c

	Nov. 12 1957	Nov. 5 1957	Oct. 15 1957	Nov. 13 1956
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.51	$70.51	$70.51	$67.76
Foundry, Valley	66.50	66.50	66.50	63.00
Foundry, Southern Cin'ti	71.65	71.65	71.65	67.17
Foundry, Birmingham	62.50	62.50	62.50	59.00
Foundry, Chicago	66.50	66.50	66.50	63.00
Basic, del'd Philadelphia	70.01	70.01	70.01	66.84
Basic, Valley furnace	66.00	66.00	66.00	62.50
Malleable, Chicago	66.50	66.50	66.50	63.00
Malleable, Valley	66.50	66.50	66.50	63.00
Ferromanganese, 74-76 pct Mn, cents per lb‡	12.25	12.25	12.25	11.75
Pig Iron Composite: (per gross ton)				
Pig iron	$66.42	$66.42	$66.42	$63.01
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$32.50	$32.50	$38.50	$62.50
No. 1 steel, Phila. area	*37.00*	35.00	37.00	58.50
No. 1 steel, Chicago	32.50	32.50	36.50	62.50
No. 1 bundles, Detroit	**24.50**	22.50	29.50	60.50
Low phos., Youngstown	33.50	33.50	38.50	68.50
No. 1 mach'y cast, Pittsburgh	50.50	50.50	52.50	61.50
No. 1 mach'y cast, Philadel'a	50.50	50.50	50.50	58.00
No. 1 mach'y cast, Chicago	40.50	40.50	43.50	58.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	*$33.00*	$33.33	$37.33	$61.17
No. 2 bundles	*24.67*	25.00	27.67	48.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$15.38	$15.38	$15.38	$15.50
Foundry coke, prompt	$17.50-$19	$17.50-$19	$17.50-$19	$18-19
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	27.00	27.00	27.00	40.00
Copper, Lake, Conn.	27.00	27.00	27.00	40.00
Tin, Straits, N. Y.	*89.50†*	89.625	91.875	107.00
Zinc, East St. Louis	10.00	10.00	10.00	13.50
Lead, St. Louis	13.30	13.30	13.30	15.80
Aluminum, virgin ingot	28.10	28.10	28.10	27.10
Nickel, electrolytic	74.00	74.00	74.00	64.50
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Averages of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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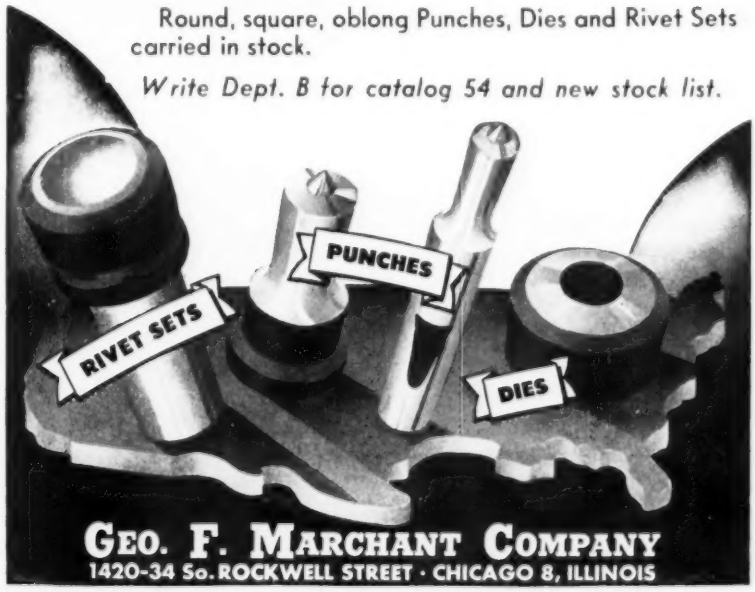

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IRON AND STEEL SCRAP MARKETS

Bargain Scrap Prices Lure Purchases

It's only some token action, but small purchases slow the market decline.

Talk by steel executives of mill self-sufficiency contributes to demoralized market condition.

▪ Mills are showing a little more interest in the bargain prices offered by the badly depressed scrap market.

The few token sales, often from restricted yards, have tended to slow the decline that has continued virtually without interruption since mid-June. In this five-months drop, prices have collapsed more than $23.

The IRON AGE No. 1 Heavy Melting Composite now stands at $33, compared with $56.17, the height of the early summer upsurge. Since then, the market has been consistently on the downgrade, although in irregular fits of depression.

Little chance of a big rebound is seen by the trade. Recent statements of mill self-sufficiency have contributed to demoralizing the market. It's known that some of the biggest consumers have no intention of buying scrap in any quantity the rest of this year.

Nevertheless, some evidences of nibbling at present prices and offers to buy at under the present price levels indicate today's prices are considered too good to pass up entirely.

Prices even edged up in Detroit, on the basis of a small buy. Some railroad lists show a little strength, even though others have been withdrawn because of too low bids.

Pittsburgh—Prices of most grades are unchanged here. There is still little mill support for the market and little prospect of tonnage buys for the rest of the year. However, there are signs that prices may be scraping bottom. A late railroad list went for higher prices than an earlier offering. One consumer is finding little interest in a price of $29 for No. 2 bundles and has been offered no No. 1 for less than $34.

Chicago—In a dull market, new sales in scattered railroad grades advanced slightly. They were bolstered by a railroad sale of No. 1 RR heavy melting, on track, at about $41-$42. Previously, one railroad list had been pulled off the market because of low bids. Offers to buy No. 2 heavy melting at as low as $26 and No. 1 heavy at $29 failed to break dealer resistance. A rash of small purchases by mills taking advantage of low price levels has firmed the market considerably.

Philadelphia — The downward price trend continues here. Railroad specialties led the slide with a $5 drop for steel wheels and spring steel, based on new lists. Openhearth grades were down $1. Due to a misunderstanding, prices of machine shop turnings last week were quoted at $17-$18. Broker buying this week confirms that the price should have remained at $21-$22.

New York—Exports continue to prop up this market, at least to a top of $31 for No. 1 heavy melting steel. Domestic business is virtually non-existent. Pipe foundries bought cast $1 below last week's quotations, lowering the market for these grades.

Detroit—Small sales of No. 1 and No. 2 heavy melting and No. 2 bundles at slightly higher than expected prices buoyed the market briefly. Brokers spread the token buying among a restricted number of dealers, going out of the market almost as fast as they entered.

Cleveland—The market continues to drag with only slight relief from a foundry order. The foundry purchased small tonnages of cut structural and plate at $37 and regular foundry steel at $35.

St. Louis—The market seems to be at a standstill and there are few price changes. Consumers are buying little, and little is being offered. A local railroad withdrew its list of 3000 tons of scrap because prices offered were too low. Price of No. 1 railroad heavy melting should have been $38.50 to $39.50 for Nov. 7.

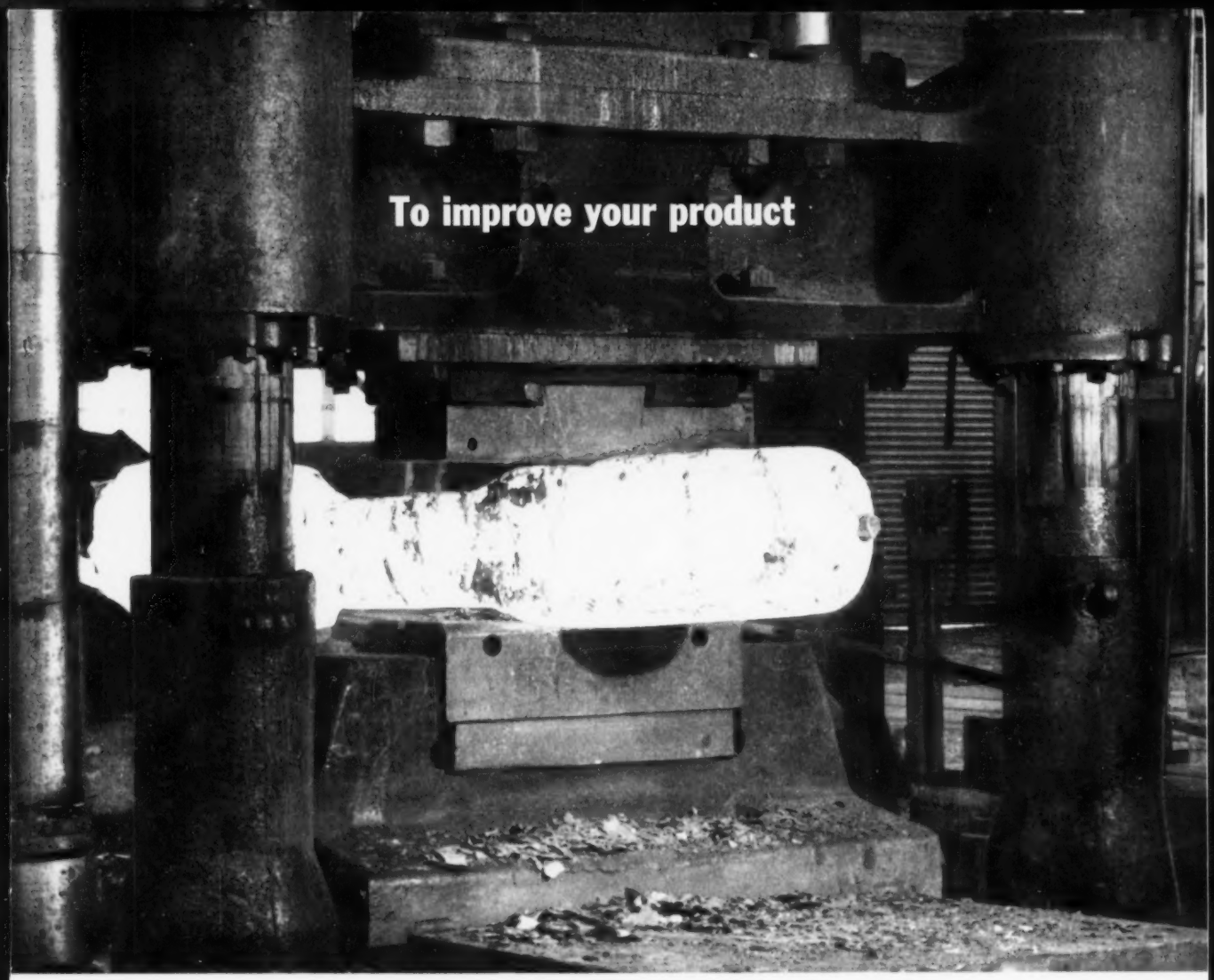
Birmingham—The market in this district continues stagnant. An Atlanta mill purchased No. 2 heavy melting and No. 2 bundles this week at prices lower than the last buy. There is some indication, however, of movement for export.

Cincinnati—The market is in a mixed-up condition with area buyers far apart on price and not anxious to purchase. Dealers are softening and taking orders at lower prices.

Buffalo—Prices are off $2 a ton on all grades on appraisal of a very weak market. In addition to low demand, the market is hampered by severe weather in this area.

Boston—There appears to be little prospect of a pickup of an inactive market. Demand is slow, activity low.

West Coast — Mills are cutting into their inventories, buying only restricted tonnages. But prices are steady, with export to Japan propping the market. Prices of mixed borings and shoveling turnings in Los Angeles were incorrectly quoted Nov. 7. Correct price for both grades on that issue should have been $18.



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SCRAP PRICES *(Effective Nov. 12, 1957)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	32.00 to 33.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	28.00 to 29.00
No. 1 busheling	32.00 to 33.00
Machine shop turn	17.00 to 18.00
Mixed bor. and mc. turn	17.00 to 18.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Low phos. punchgs. plate	36.00 to 37.00
Heavy turnings	31.00 to 32.00
No. 1 RR hvy. melting	36.00 to 37.00
Scrap rails, random lgth.	49.00 to 50.00
Rails 2 ft and under	56.00 to 57.00
RR steel wheels	48.00 to 49.00
RR spring steel	48.00 to 49.00
RR couplers and knuckles	48.00 to 49.00
No. 1 machinery cast	50.00 to 51.00
Cupola cast	41.00 to 42.00
Heavy breakable cast	39.00 to 40.00

Chicago

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	32.00 to 33.00
No. 1 factory bundles	36.00 to 37.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	32.00 to 33.00
Machine shop turn	16.00 to 17.00
Mixed bor. and turn	18.00 to 19.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. forge crops	45.00 to 46.00
Low phos. punchgs. plate	40.00 to 41.00
Low phos. 2 ft and under	40.00 to 41.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rails, random lgth.	41.00 to 42.00
Rerolling rails	48.00 to 49.00
Rails 2 ft and under	47.00 to 48.00
Locomotive tires cut	44.00 to 45.00
Cut boilers & side frames	43.00 to 44.00
Angles and splice bars	46.00 to 47.00
RR steel car axles	48.00 to 49.00
RR couplers and knuckles	43.00 to 44.00
No. 1 machinery cast	40.00 to 41.00
Cupola cast	35.00 to 36.00
Heavy breakable cast	33.00 to 34.00
Cast iron brake shoes	35.00 to 36.00
Cast iron wheels	41.00 to 42.00
Malleable	48.00 to 49.00
Stove plate	33.00 to 34.00
Steel car wheels	46.00 to 47.00

Philadelphia Area

No. 1 hvy. melting	$33.50 to $34.50
No. 2 hvy. melting	30.50 to 31.50
No. 1 dealer bundles	34.50 to 35.50
No. 2 bundles	24.50 to 25.50
No. 1 busheling	34.50 to 35.50
Machine shop turn	21.00 to 22.00
Mixed bor. short turn	22.00 to 23.00
Cast iron borings	22.00 to 24.00
Shoveling turnings	24.00 to 25.00
Clean cast chem. borings	30.00 to 31.00
Low phos. 5 ft and under	44.00 to 45.00
Low phos. 2 ft and under	45.00 to 46.00
Low phos. punchgs.	45.00 to 46.00
Elec. furnace bundles	29.00 to 30.00
Heavy turnings	30.50 to 31.50
RR steel wheels	48.00 to 49.00
RR spring steel	48.00 to 49.00
Rails 18 in. and under	65.00 to 66.00
Cupola cast	38.00 to 39.00
Heavy breakable cast	28.00 to 29.00
Cast iron car wheels	45.00 to 46.00
Malleable	58.00 to 59.00
Unstripped motor blocks	32.00 to 33.00
No. 1 machinery cast	50.00 to 51.00

Cleveland

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	29.00 to 30.00
No. 1 factory bundles	32.50 to 33.50
No. 2 bundles	21.00 to 22.00
No. 1 busheling	29.00 to 30.00
Machine shop turn	13.00 to 14.00
Mixed bor. and turn	15.00 to 16.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	15.00 to 16.00
Cut structural & plates, 2 ft & under	35.00 to 36.00
Drop forge flashings	29.00 to 30.00
Low phos. punchgs. plate	30.00 to 31.00
Foundry steel, 2 ft & under	31.00 to 32.00
No. 1 RR heavy melting	34.00 to 35.00
Rails 2 ft and under	55.00 to 56.00
Rails 18 in. and under	56.00 to 57.00
Railroad grate bars	16.00 to 17.00
Steel axle turnings	17.00 to 18.00
Railroad cast	42.00 to 43.00
No. 1 machinery cast	45.00 to 46.00
Stove plate	40.00 to 41.00
Malleable	54.00 to 55.00

Youngstown

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 dealer bundles	32.00 to 33.00
No. 2 bundles	24.00 to 25.00
Machine shop turn	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	20.00 to 21.00
Low phos. plate	33.00 to 34.00

Buffalo

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 busheling	30.00 to 31.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	24.50 to 25.50
Machine shop turn	14.00 to 15.00
Mixed bor. and turn	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	16.00 to 17.00
Low phos. plate	36.00 to 37.00
Scrap rails, random lgth.	42.00 to 43.00
Rails 2 ft and under	52.00 to 53.00
RR steel wheels	39.00 to 40.00
RR spring steel	35.00 to 36.00
RR couplers and knuckles	35.00 to 36.00
No. 1 machinery cast	42.00 to 43.00
No. 1 cupola cast	37.00 to 38.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	23.00 to 24.00
Drop forge flashings	23.00 to 24.00
Machine shop turn	9.00 to 10.00
Mixed bor. and turn	11.00 to 12.00
Shoveling turnings	11.00 to 12.00
Cast iron borings	11.00 to 12.00
Low phos. punchgs. plate	24.00 to 25.00
No. 1 cupola cast	31.00 to 32.00
Heavy breakable cast	26.00 to 27.00
Stove plate	26.00 to 27.00
Automotive cast	34.00 to 35.00

St. Louis

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	26.00 to 27.00
Machine shop turn	14.00 to 15.00
Cast iron borings	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
No. 1 RR hvy. melting	38.50 to 39.50
Rails, random lengths	42.00 to 43.00
Rails, 18 in. and under	48.00 to 49.00
Angles and splice bars	41.00 to 42.00
Std. steel car axles	45.00 to 46.00
RR specialties	43.00 to 44.00
Cupola cast	42.00 to 43.00
Heavy breakable cast	35.00 to 36.00
Cast iron brake shoes	35.00 to 36.00
Stove plate	35.00 to 36.00
Cast iron car wheels	35.00 to 36.00
Rerolling rails	49.00 to 50.00
Unstripped motor blocks	34.00 to 36.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$24.00 to $25.00
No. 2 hvy. melting	21.00 to 22.00
No. 1 dealer bundles	24.00 to 25.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	24.00 to 25.00
Elec. furnace, 3 ft & under	35.00 to 36.00
Machine shop turn	10.00 to 11.00
Mixed bor. and short turn	10.00 to 11.00
Shoveling turnings	11.00 to 12.00
Clean cast chem. borings	15.00 to 16.00
No. 1 machinery cast	34.00 to 35.00
Mixed cupola cast	29.00 to 30.00
Heavy breakable cast	29.00 to 30.00
Stove plate	26.00 to 27.00
Unstripped motor blocks	29.00 to 30.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	26.00 to 27.00
No. 2 dealer bundles	19.00 to 20.00
Machine shop turn	11.00 to 12.00
Mixed bor. and turn	13.00 to 14.00
Shoveling turnings	16.00 to 16.00
Clean cast chem. borings	23.00 to 24.00
No. 1 machinery cast	36.00 to 37.00
Mixed yard cast	31.00 to 32.00
Charging box cast	32.00 to 33.00
Heavy breakable cast	32.00 to 33.00
Unstripped motor blocks	29.00 to 30.00

Birmingham

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	16.00 to 17.00
No. 1 busheling	31.00 to 32.00
Machine shop turn	20.00 to 21.00
Shoveling turnings	21.00 to 22.00
Cast iron borings	15.00 to 16.00
Electric furnace bundles	35.00 to 36.00
Elec. furnace, 3 ft & under	33.00 to 34.00
Bar crops and plate	38.00 to 39.00
Structural and plate, 2 ft	38.00 to 39.00
No. 1 RR hvy. melting	34.00 to 35.00
Scrap rails, random lgth.	41.00 to 42.00
Rails, 18 in. and under	49.00 to 50.00
Angles & splice bars	40.00 to 41.00
Rerolling rails	50.00 to 51.00
No. 1 cupola cast	47.00 to 48.00
Stove plate	47.00 to 48.00
Charging box cast	22.00 to 23.00
Cast iron car wheels	37.00 to 38.00
Unstripped motor blocks	35.00 to 36.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.50 to $30.50
No. 2 hvy. melting	24.50 to 25.50
No. 1 dealer bundles	29.50 to 30.50
No. 2 bundles	21.00 to 22.00
Machine shop turn	15.00 to 16.00
Mixed bor. and turn	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos., 18 in. and under	37.00 to 38.00
Rails, random length	44.00 to 45.00
Rails, 18 in. and under	54.00 to 55.00
No. 1 cupola cast	35.00 to 36.00
Hvy. breakable cast	32.00 to 33.00
Drop broken cast	47.00 to 48.00

San Francisco

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	34.00
No. 1 dealer bundles	34.00
No. 2 bundles	26.00
Machine shop turn	20.00
Cast iron borings	20.00
No. 1 RR hvy. melting	36.00
No. 1 cupola cast	47.00

Los Angeles

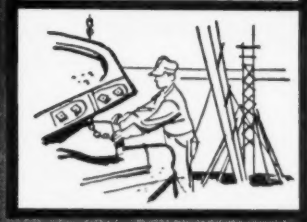
No. 1 hvy. melting	$36.00
No. 2 hvy. melting	34.00
No. 1 dealer bundles	32.00 to 34.00
No. 2 bundles	20.00 to 21.00
Machine shop turn	15.00
Shoveling turnings	15.00
Cast iron borings	15.00
Elec. furn. 1 ft and under	
foundry	46.00 to 47.00
No. 1 RR hvy. melting	36.00
No. 1 cupola cast	42.00 to 44.00

Seattle

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	34.00
No. 2 bundles	27.00
No. 1 cupola cast	38.00
Mixed yard cast	38.00

Hamilton, Ont.

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	30.00
No. 1 dealer bundles	35.00
No. 2 bundles	25.00
Mixed steel scrap	30.00
Busheling	25.00
Bush., new fact., prep'd.	35.00
Bush., new fact., unprep'd	29.00
Machine shop turn	20.00
Short steel turn	24.00
Mixed bor. and turn	20.00
Rails, rerolling	44.00
Cast scrap	45.00 to 50.00



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NONFERROUS MARKETS

Dow to Get Velasco Magnesium Plant

GSA agrees to sell U. S. owned plant to Dow Chemical Co. But price is $1.3 million more than the initial bid.

Company now owns virtually all domestic magnesium capacity.

■ General Services Administration has finally decided to sell its magnesium smelter at Velasco, Tex., to Dow Chemical Co. This seems logical enough, since Dow (1) submitted the high bid, and (2) built the plant for the government in 1942, and has been running it on lease since.

Dow will pay $20.7 million, one-third down and the rest within six years. The company's initial bid was $19.37 million, with 20 pct down and the balance over a 10 year period. Original bids, by Dow, and Velasco Magnesium Corp., were submitted in May.

Justice Opposed—Dow had bid on Velasco several times before. Each time the Justice Dept. advised against the transaction because it would solidify Dow's position as the only producer in the U. S. Washington observers say Justice may have again advised against the sale to Dow. GSA is not bound by a Justice Dept. recommendation.

It is no secret that Velasco was becoming more and more of a headache for GSA. Improvements in its 15 year existence have been slight because it was being run on a leased basis. Some of the equipment is approaching obsolescence lowering the value of the plant, which originally cost $26.5 million.

More Complications—To further complicate the situation, sale of the smelter to anyone except Dow would entail extensive negotiation. Dow owns some of the associated facilities vital to Velasco operation. Dow was willing to negotiate for sale of power and other services should another company's bid for Velasco be accepted. But, its Freeport plant is only 8 miles away.

Dow's current lease expires Jan. 31, 1958. There were rumors, not denied, that Dow was thinking hard about whether to renew the lease. And even if they did, GSA would only be postponing its problem for another three years, when they would probably get even less for the plant.

Dow Owns All—Dow now owns virtually all the domestic magnesium capacity, which is why the Justice Dept. has repeatedly recommended against the sale of the plant to Dow.

Alabama Metallurgical Corp. will enter the field by 1959. But capacity will be less than 10,000 tons of special, high purity metal.

Now that Dow owns Velasco outright it will definitely boost capacity. However, it is likely that it will be some time before this shows up in shipments since current plans call for replacement of older equipment with new-type, high capacity cells, the basic producing unit.

Copper

Last week, custom smelters bumped their price 1/2¢ per lb, to 26¢ on the basis of more consumer demand. By the beginning of the week buying interest had settled back to its previous moderate levels. Custom smelters are still quoting 26¢ per lb, but the market is weak.

Ingot Makers Higher—For the first time in some time ingot makers are quoting over 1¢ per lb more than custom smelters for No. 1 copper scrap. Smelters, who lean more heavily on No. 2 copper, say their activity just doesn't warrant boosting prices to meet ingot maker levels on No. 1. Ingot makers say that even the higher levels are not bringing in much No. 1 copper, blame this on lower rate of generation in addition to dealers laying it in.

Aluminum

Hot metal contracts will get an airing before the House Small Business Committee on Aluminum, November 18 and 19.

Some independent casters say the system amounts to a discount on the price of pig aluminum, and as such is an unfair business practice.

Hot metal contracts were in the limelight earlier this year when Reynolds Metals and Chevrolet agreed to build plants side-by-side at Massena, N. Y.

Tin prices for the week: Nov. 6—89.375; Nov. 7—89.50; Nov. 8—89.50; Nov. 11—holiday; Nov. 12—89.50.*

* Estimate.

Primary Prices

(cents per lb)	Current price	last price	date of change
Aluminum pig	26.00	25.00	8/1/57
Aluminum ingot	28.10	27.10	8/1/57
Copper (E)	27.00	28.50	9/3/57
Copper (CS)	26.00	25.50	11/6/57
Copper (L)	27.00	28.50	9/3/57
Lead, St. L.	13.30	13.80	10/14/57
Lead, N. Y.	13.50	14.00	10/14/57
Magnesium ingot	36.00	34.00	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	84.50	12/6/56
Titanium sponge	165-250	165-225	5/5/57
Zinc, E. St. L.	10.00	10.50	7/1/57
Zinc, N. Y.	10.50	11.00	7/1/57

ALUMINUM: 99% ingot frt allwd. **COPPER:** (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. **LEAD:** common grade. **MAGNESIUM:** 99.8% pig. Velasco, Tex. **NICKEL:** Port Colbourne, Canada. **ZINC:** prime western. **TIN:** see above; other primary prices, pg. 218.

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An experienced blender of fine tobaccos can give you a mixture that literally "has your name on it." And just so can Bristol Brass metallurgists give you *your own personal alloy* that fits your manufacturing methods and your product-in-use requirements more closely than you've ever had it before.

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NONFERROUS PRICES

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-.249	.250-3
1100, 3003	46 6	44 3	43 6	42 7
5052	54 0	48 9	47 2	45 4
6061-0	51 4	47 0	45 2	45 1

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6-8	45 0-46 8	60 4-64 1
12-14	45 7-47 2	61 3-65 8
24-26	49 0-49 5	72 1-76 8
36-38	58 0-58 6	96 2-99 8

Screw Machine Stock—2011-T-3

Size*	¼	5/16-⅜	⅞-1	1¼-1½
Price	63 0	62 5	61 0	58 6

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length*→	72	96	120	144
.019 gage	$1 420	$1 893	$2 367	$2 839
.024 gage	1 774	2 366	2 957	3 549

MAGNESIUM

(F.o.b. shipping Pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250-3 00	.250-2 00	.188	.081	.032
AZ31B Stand. Grade	...	67 9	69 0	77 9	108 1
AZ31B Spec.	...	93 3	95 7	108 7	171 3
Tread Plate	...	70 6	71 7	...	...
Tooling Plate	73 0	...	...	...	...

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69 6	70 7	75 6	89 2
Spec. Grade (AZ31B)	84 6	85 7	90 6	104 2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	126	106	128
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	120	105	121
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included on 5000 lbs)

	Sheet	Wire	Red	Tube
Copper	50 13		47 36	50 32
Brass, 70/30	44 02	44 56	45 26	46 93
Brass, Low	46 50	47 04	46 44	49 31
Brass, R L	47 37	47 91	47 31	50 18
Brass, Naval	48 27		42 58	51 68
Munts Metal	46 39		42 20	
Comm. Bs.	48 78	49 32	48 72	51 34
Mang. Bs.	52 01		46 11	
Phos. Bs. 5%	69 07		69 57	

Free Cutting Brass Rod 32.30

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $9.50-$10.60; alloy, $14.75; Plate, HR, commercially pure, $8.00-$8.75; alloy, $10.75. Wire, rolled and/or drawn, commercially pure, $7.50-$8.00; alloy $10.00; Bar, HR or forged, commercially pure, $6.15-$6.40; alloy, $6.15-$6.35; billets, HR, commercially pure, $6.00-$6.25; alloy, $6.00-$6.20.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Antimony, American, Laredo, Tex... 33.50
Beryllium aluminum 5% Be, Dollar per lb contained Be $74.75
Beryllium copper, per lb cont'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots .....$ 2.25
Cadmium del'd .....$ 1.70
Calcium, 99.9%, small lots .....$ 4.55
Chromium, 99.8% metallic basis ...$ 1.31
Cobalt, 97-99% (per lb) ....$2.00 to $2.07
Germanium, per gm, f.o.b. Miami, Okla., refined .....39.50 to 53.50
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9%, dollars per troy oz...$ 2.25
Iridium, dollars per troy oz. ...$86 to $89
Lithium, 98% .....$11.00 to $14.00
Magnesium, sticks, 100 to 500 lb.... 59.00
Mercury, dollars per 76-lb flask, f.o.b. New York .....$230 to $233
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 71.25
Palladium, dollars per troy oz..$23 to $24
Platinum, dollars per troy oz..$82 to $87
Rhodium .....$120.00 to $125.00
Silver ingots (¢ per troy oz.) 90.625
Thorium, per kg. $43.00
Uranium, normal per kg. $40.00
Vanadium .....$ 3.45
Zirconium sponge $10.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 27.25
No. 120 ..... 26.25
No. 123 ..... 25.50
80-10-10 ingot
No. 305 ..... 31.25
No. 315 ..... 29.25
88-10-2 ingot
No. 210 ..... 38.25
No. 215 ..... 34.00
No. 245 ..... 30.75
Yellow ingot
No. 405 ..... 22.75
Manganese bronze
No. 421 ..... 24.50

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.25-26.00
0.60 copper max. 25.00-25.75
Piston alloys (No. 122 type)...24.25-25.00
No. 12 alum. (No. 2 grade) ...22.00-23.00
108 alloy 22.25-23.00
195 alloy 25.25-26.75
13 alloy (0.60 copper max.)...25.00-25.75
AXS-679 .....22.25-23.00

(Effective Nov. 11, 1957)

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 23.00-24.00
Grade 2—92-95% 21.75-22.50
Grade 3—90-92% 20.50-21.50
Grade 4—85-90% 18.25-19.25

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	23	22¼
Yellow brass	17⅝	15⅝
Red brass	20¼	19¼
Comm. bronze	21	20¼
Mang. bronze	16½	15⅝
Yellow brass rod ends	17⅛	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 21½
No. 2 copper wire 20
Light copper 17⅝
*Refinery brass 19½
Copper bearing material 19

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 22⅝
No. 2 copper wire 20
Light copper 17⅝
No. 1 composition 19½
No. 1 comp. turnings 19
Hvy. yellow brass solids 13¼
Brass pipe 16
Radiators 15½

Aluminum

Mixed old cast ..... 13½—14½
Mixed new clips ..... 16 —17
Mixed turnings, dry ..... 14 —15

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 19 —19½
No. 2 copper wire ..... 17 —17½
Light copper ..... 15½—16
Auto radiators (unsweated).. 11¾—12
No. 1 composition ..... 15½—16
No. 1 composition turnings... 15 —15½
Cocks and faucets ..... 12 —12½
Clean heavy yellow brass.... 11 —11½
Brass pipe ..... 12½—13
New soft brass clippings .... 13 —13½
No. 1 brass rod turnings .... 11¼—11⅝

Aluminum

Alum. pistons and struts .... 5½— 6
Aluminum crankcases ..... 10½—11
1100 (2S) aluminum clippings 14 —14½
Old sheet and utensils ..... 10½—11
Borings and turnings ..... 6½— 7
Industrial castings ..... 10½—11
2024 (24S) clippings ..... 12 —12½

Zinc

New zinc clippings ..... 4 — 4½
Old zinc ..... 3 — 3½
Zinc routings ..... 1¾ — 2
Old die cast scrap ..... 1½— 1¾

Nickel and Monel

Pure nickel clippings 50-55
Clean nickel turnings 45-50
Nickel anodes 50-55
Nickel rod ends 50-55
New Monel clippings 33-35
Clean Monel turnings 22-25
Old sheet Monel 30-33
Nickel silver clippings, mixed. 20
Nickel silver turnings, mixed. 17

Lead

Soft scrap lead ..... 8½— 9
Battery plates (dry) ..... 4 — 4¼
Batteries, acid free ..... 2¾— 3

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 59 —60
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 11 —11½
Solder joints ..... 15 —15½
Siphon tops 42
Small foundry type ..... 12½—12⅝
Monotype ..... 12½—12⅝
Linotype and stereotype ..... 11½—11⅝
Electrotype ..... 10½—10⅝
Hand picked type shells ..... 7½— 8
Lino. and stereo. dross ..... 3½— 3⅝
Electro dross ..... 2⅝— 3

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$114.00 *B3*		5.325 *B3*	7.80 *B3*	5.325 *B3*						
	Buffalo, N. Y.	$77.50 *R3, B3*	$96.00 *R3, B3*	$114.00 *R3, B3*	6.225 *B3*	5.325 *B3*	7.80 *B3*	5.325 *B3*	4.925 *R3, B3*	7.15 *S10*	7.325 *B3*			
	Phila., Pa.									7.70 *P15*				
	Harrison, N. J.													15.05 *C11*
	Conshohocken, Pa.		$101.00 *A2*	$121.00 *A2*					4.975 *A2*	7.20 *A2*	7.325 *A2*			
	New Bedford, Mass.									7.60 *R6*				
	Johnstown, Pa.	$77.50 *B3*	$96.00 *B3*	$114.00 *B3*		5.325 *B3*	7.80 *B3*							
	Boston, Mass.									7.70 *T8*				15.40 *T8*
	New Haven, Conn.									7.60 *D1*				
	Baltimore, Md.									7.15 *T8*				
	Phoenixville, Pa.					5.325 *P2*		5.325 *P2*						
	Sparrows Pt., Md.								4.925 *B3*		7.325 *B3*			
	Bridgeport, Wallingford, Conn.	$80.50 *N8*	$101.00 *N8*	$114.00 *N8*						7.60 *W1*				
	Pawtucket, R. I. Worcester, Mass.									7.70 *N7* 7.70 *A5*				15.40 *N7* 15.20 *T8*
MIDDLE WEST	Alton, Ill.								5.125 *L1*					
	Ashland, Ky.								4.925 *A7*					
	Canton-Massillon, Dover, Ohio		$96.00 *R3*	$114.00 *R3, T5*						7.15 *G4*		10.45 *G4*		14.85 *C11*
	Chicago, Ill. Franklin Park, Ill. Evanston, Ill.	$77.50 *U1, R3*	$96.00 *U1, R3,W8*	$114.00 *U1, R3,W8*	6.225 *U1*	5.275 *U1, W8,P13*	7.75 *U1,Y1 W8*	5.275 *U1*	4.925 *W8, N4,A1*	7.25 *A1,T8 M8*			8.10 *W8, S9,I3*	15.05 *A1, S9,G4*
	Cleveland, Ohio									7.15 *A5,J3*		10.45 *A5*	8.10 *J3*	
	Detroit, Mich.			$114.00 *R3*					5.025 *G3, M2*	7.25 *M2,D1, D2,G3,P11*	7.425 *G3*	10.60 *D2* 10.55 *G3*	8.10 *G3*	
	Anderson, Ind.									7.15 *G4*				
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$77.50 *U1*	$96.00 *U1*	$114.00 *U1, Y1*		5.275 *U1, I3*	7.75 *U1, I3*	5.275 *I3*	4.925 *U1, I3,Y1*	7.15 *Y1*	7.325 *U1, I3,Y1*	10.60 *Y1*	8.10 *U1, Y1*	
	Sterling, Ill.	$77.50 *N4*				5.275 *N4*			5.025 *N4*					
	Indianapolis, Ind.									7.30 *J3*				15.20 *J3*
	Newport, Ky.												8.10 *A9*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$96.00 *S1, C10*	$114.00 *C10,S1*					4.925 *R3, S1*	7.15 *R3,T4 S1*	7.325 *R3, S1*	10.50 *S1* 10.45 *R3*	8.10 *S1*	15.05 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Aliquippa, Pa.	$77.50 *U1, P6*	$96.00 *U1, C11,P6*	$114.00 *U1, C11,B7*	6.225 *U1*	5.275 *U1, J3*	7.75 *U1, J3*	5.275 *U1*	4.925 *P6*	7.15 *J3,B4, S7*			8.10 *S9*	15.05 *S9*
	Weirton, Wheeling, Follansbee, W. Va.					5.275 *W3*			4.925 *W3*	7.15 *W3,F3*	7.325 *W3*	10.50 *W3*		
	Youngstown, Ohio	$77.50 *R3*	$96.00 *Y1, C10*	$114.00 *Y1*			7.75 *Y1*			7.15 *Y1,J3*	7.325 *U1, Y1*	10.65 *Y1*	8.10 *U1, Y1*	15.05 *J3* 10.65 *Y1*
WEST	Fontana, Cal.	$88.00 *K1*	$105.50 *K1*	$135.00 *K1*		6.075 *K1*	8.55 *K1*	6.225 *K1*	5.825 *K1*	9.00 *K1*				
	Geneva Utah		$96.00 *C7*			5.275 *C7*	7.75 *C7*							
	Kansas City, Mo.					5.375 *S2*	7.85 *S2*						8.35 *S2*	
	Los Angeles, Torrance, Cal.		$105.50 *B2*	$134.00 *B2*		5.975 *C7, B2*	8.45 *B2*		5.675 *C7, B2*	9.05 *J3*			9.30 *B2*	17.25 *J3*
	Minnequa, Colo.					5.575 *C6*			6.025 *C6*	9.10 *K1*				
	Portland, Ore.					6.025 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$105.50 *B2*			5.925 *B2*	8.40 *B2*		5.675 *C7, B2*					
	Seattle, Wash.		$109.50 *B2*			6.025 *B2*	8.50 *B2*		5.925 *B2*					
SOUTH	Atlanta, Ga.					5.475 *A8*			5.125 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$77.50 *T2*	$96.00 *T2*			5.275 *T2, R3,C16*	7.75 *T2*		4.925 *T2, R3,C16*		7.325 *T2*			
	Houston, Lone Star, Texas		$101.00 *S2*	$119.00 *S2*		5.375 *S2*	7.85 *S2*						8.35 *S2*	

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IRON AGE

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES

		SHEETS								WIRE ROD	TINPLATE†		BLACK PLATE
		Hot rolled 18 ga. & heavy	Cold rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Cokes* 1.25 lb. base box	Electro* 0.25 lb. base box	Hollowware Enameling 29 ga.
EAST	Bethlehem, Pa.												
	Buffalo, N. Y.	4.925 *B3*	6.05 *B3*				7.275 *B3*	8.975 *B3*		6.15 *W6*	† Special coated mfg. terne deduct 50c from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25c. ELECTRO: 0.50-lb. add 25c; 0.75-lb. add 65c; 1.00-lb. add $1.00. Differential 1.00 lb. 0.25 lb. add 65c.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	4.975 *A2*	6.10 *A2*				7.325 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.15 *B3*			
	Fairless, Pa.	4.975 *U1*	6.10 *U1*				7.325 *U1*	9.025 *U1*			$10.15 *U1*	$8.85 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	4.925 *B3*	6.05 *B3*	6.60 *B3*			7.275 *B3*	8.975 *B3*	9.725 *B3*	6.25 *B3*	$10.15 *B3*	$8.85 *B3*	
	Worcester, Mass.									6.45 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.35 *L1*			
	Ashland, Ky	4.925 *A7*		6.60 *A7*	6.625 *A7*								
	Canton-Massillon, Dover, Ohio			6.60 *R3, R1*									
	Chicago, Joliet, Ill.	4.925 *W8, A1*					7.275 *U1*			6.15 *A5, R3,W8, N4, K2*			
	Sterling, Ill.									6.25 *N4, K2*			
	Cleveland, Ohio	4.925 *R3, J3*	6.05 *R3, J3*		6.625 *R3*		7.275 *R3, J3*	8.975 *R3, J3*		6.15 *A5*			
	Detroit, Mich.	5.025 *G3, M2*	6.15 *G3* 6.05 *M2*				7.375 *G3*	9.075 *G3*					
	Newport, Ky	4.925 *A1*	6.05 *A1*										
	Gary, Ind. Harbor, Indiana	4.925 *U1, I3,Y1*	6.05 *U1, I3,Y1*	6.60 *U1, I3*	6.625 *U1, I3,Y1*	7.00 *U1*	7.275 *U1, Y1,I3*	8.975 *U1, Y1*		6.15 *Y1*	$10.05 *U1, Y1*	$8.75 *I3, U1,Y1*	7.50 *U1, Y1*
	Granite City, Ill.	5.125 *G2*	6.25 *G2*	6.80 *G2*	6.825 *G2*							$8.85 *G2*	7.60 *G2*
	Kokomo, Ind.			6.70 *C9*						6.25 *C9*			
	Mansfield, Ohio		6.05 *E2*			7.00 *E2*							
	Middletown, Ohio		6.05 *A7*	6.60 *A7*	6.625 *A7*	7.00 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	4.925 *R3, N3,S1*	6.05 *R3*	6.60 *R3*	6.625 *N3, S1*	7.00 *N3, S1,R3*	7.275 *R3*	8.975 *S1, R3*				$8.75 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa. Donora, Pa. Aliquippa, Pa.	4.925 *U1, J3,P6*	6.05 *U1, J3,P6*	6.60 *U1, J3*	6.625 *U1*		7.275 *U1, J3*	8.975 *U1, J3*	9.725 *U1*	6.15 *A5, J3,P6*	$10.05 *U1, J3*	$8.75 *U1, J3*	7.50 *U1, J3*
	Portsmouth, Ohio	4.925 *P7*	6.05 *P7*							6.15 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.925 *W3, W5*	6.05 *W3, F3,W5*	6.60 *W3, W5*		7.00 *W3, W5*	7.275 *W3*	8.975 *W3*			$10.05 *W5, W3*	$8.75 *W5, W3*	7.50 *W5*
	Youngstown, Ohio	4.925 *U1, Y1*	6.05 *Y1*		6.625 *Y1*		7.275 *Y1*	8.975 *Y1*		6.15 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.30 *K1*				8.175 *K1*	10.275 *K1*			$10.80 *K1*	$9.50 *K1*	
	Geneva, Utah	5.025 *C7*											
	Kansas City, Mo.									6.40 *S2*			
	Los Angeles, Torrance, Cal.									6.95 *B2*			
	Minnequa, Colo.									6.40 *C6*			
	San Francisco, Niles, Pittsburgh, Cal.	5.625 *C7*	7.00 *C7*	7.35 *C7*						6.95 *C7*	$10.80 *C7*	$9.50 *C7*	
	Seattle, Wash.												
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	4.925 *T2, R3*	6.05 *T2, R3*	6.60 *T2, R3*						6.15 *T2, R3*	$10.15 *T2*	$8.85 *T2*	
	Houston, Tex.									6.40 *S2*			

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IRON AGE

STEEL PRICES

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		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfrs'. Bright
EAST	Bethlehem, Pa.				6.475 *B3*	8.775 *B3*	7.925 *B3*					
	Buffalo, N. Y.	5.425 *R3,B3*	5.425 *R3,B3*	7.35 *B3*	6.475 *B3,R3*	8.775 *B3,B5*	7.925 *B3*	5.10 *B3*		7.20 *B3*		7.65 *W6*
	Claymont, Del.							5.10 *C4*		7.20 *C4*	7.625 *C4*	
	Coatesville, Pa.							5.10 *L4*		7.20 *L4*	7.925 *L4*	
	Conshohocken, Pa.							5.20 *A2*	6.175 *A2*	7.20 *A2*	7.625 *A2*	
	Harrisburg, Pa.							5.80 *P2*	6.275 *P2*			
	Milton, Pa.	5.575 *M7*	5.575 *M7*									
	Hartford, Conn.			7.80 *R3*		9.075 *R3*	7.925 *B3*					
	Johnstown, Pa.	5.425 *B3*	5.425 *B3*		6.475 *B3*			5.10 *B3*		7.20 *B3*	7.625 *B3*	7.65 *B3*
	Fairless, Pa.	5.575 *U1*	5.575 *U1*		6.625 *U1*							
	Newark, N. J. Camden, N. J.			7.75 *W10* 7.75 *P10*		8.95 *W10* 8.95 *P10*						
	Bridgeport, Conn. Putnam, Conn. Willimantic, Conn.	5.65 *N8*	5.65 *N8*	7.65 *N8* 7.85 *W10* 7.80 *J3*	6.55 *N8*	8.925 *N8*						
	Sparrows Pt., Md.		5.425 *B3*					5.10 *B3*		7.20 *B3*	7.625 *B3*	7.75 *B3*
	Palmer, Worcester, Readville, Mass. Mansfield, Mass.			7.85 *B5,C14*		9.075 *A5,B5*						7.95 *A5,W6*
	Spring City, Pa.			7.75 *K4*		8.95 *K4*						
MIDDLE WEST	Alton, Ill.	5.625 *L1*										7.85 *L1*
	Ashland, Newport, Ky.							5.10 *A7,A1*		7.20 *A1*		
	Canton, Massillon, Ohio			7.30 *R3,R2*	6.475 *R3,T5*	8.775 *R3,R2,T5*						
	Chicago, Joliet, Waukegan, Ill. Harvey, Ill.	5.425 *U1,R3,W8,N4,P13*	5.425 *U1,R3,N4,P13*	7.30 *A5,W10,W8 B5,L2,N9*	6.475 *U1,R3,W8*	8.775 *A5,W10,W8 L2,N8,B5*	7.925 *U1,W8*	5.10 *U1,A1,W8,I3*	6.175 *U1*	7.20 *U1,W8*	7.625 *U1,W8*	7.65 *A5,R3,W8,N4,K2,W7*
	Cleveland, Ohio	5.425 *R3*	5.425 *R3*	7.30 *A5,C13*		8.775 *A5,C13*	7.925 *R3*	5.20 *R3,J3*	6.175 *J3*		7.625 *R3,J3*	7.65 *A5,C13*
	Detroit, Mich.	5.525 *G3*	5.775 *G3*	7.30 *J3* 7.50 *P8,B5*	6.475 *J3* 6.575 *G3*	8.775 *R3* 8.975 *B5,P3,P8*	8.025 *G3*	5.20 *G3*		7.35 *G3*		
	Duluth, Minn.											7.65 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.425 *U1,I3,Y1*	5.425 *U1,I3,Y1*	7.30 *R3,J3*	6.475 *U1,I3,Y1*	8.775 *R3,M4*	7.925 *U1,Y1*	5.10 *U1,I3,Y1*	6.175 *J3,I3*	7.20 *U1,Y1*	7.625 *U1,Y1,I3*	7.75 *M4*
	Granite City, Ill.							5.30 *G2*				
	Kokomo, Ind.											7.75 *C9*
	Sterling, Ill.	5.525 *N4*	5.525 *N4*					5.10 *N4*				7.75 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.30 *C10*	6.475 *C10,S1*	8.775 *C10*	7.925 *S1*	5.10 *R3,S1*		7.20 *S1*	7.625 *R3,S1*	
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.425 *U1,J3*	5.425 *U1,J3*	7.30 *A5,B4,R3,J3,C11,W10,S9,C8*	6.475 *U1,J3,C11,B7*	8.775 *A5,W10,R3,S9,C11,C8*	7.925 *U1,J3*	5.10 *U1,J3*	6.175 *U1*	7.20 *U1,J3,B7*	7.625 *U1,J3,B7*	7.65 *A5,J3,P6*
	Portsmouth, Ohio											7.65 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.10 *W5*				*
	Youngstown, Ohio	5.425 *U1,R3,Y1*	5.425 *U1,R3,Y1*	7.30 *A5,Y1,F2*	6.475 *U1,Y1*	8.775 *Y1,F2*	7.925 *U1,Y1*	5.10 *U1,R3,Y1*		7.20 *Y1*	7.625 *U1,R3,Y1*	7.65 *Y1*
WEST	Emeryville, Cal. Fontana, Cal.	6.175 *J5* 6.125 *K1*	6.175 *J5* 6.125 *K1*		7.525 *K1*		8.625 *K1*	5.90 *K1*		8.00 *K1*	8.425 *K1*	
	Geneva, Utah							5.10 *C7*			7.625 *C7*	
	Kansas City, Mo.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*					7.90 *S2*
	Los Angeles, Torrance, Cal.	6.125 *C7,B2*	6.125 *C7,B2*	8.75 *R3,P14*	7.525 *B2*	10.65 *P14*	8.625 *B2*					8.60 *B2*
	Minnequa, Colo.	5.875 *C6*	5.875 *C6*					5.95 *C6*				7.90 *C6*
	Portland, Ore.	6.175 *O2*	6.175 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.125 *C7* 6.175 *B2*	6.125 *C7* 6.175 *B2*				8.675 *B2*					8.60 *C7,C6*
	Seattle, Wash.	6.175 *B2,N6*	6.175 *B2*				8.675 *B2*	6.00 *B2*		8.10 *B2*	8.525 *B2*	
SOUTH	Atlanta, Ga.	5.625 *A8*	5.625 *A8*									7.85 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.425 *T2,R3,C16*	5.425 *T2,R3,C16,S11*	7.90 *C16*			7.925 *T2*	5.10 *T2,R3*			7.625 *T2*	7.65 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.675 *S2*	5.675 *S2*		6.725 *S2*		8.175 *S2*	5.20 *S2* 5.45 *L3*		7.30 *S2*	7.725 *S2*	7.90 *S2*

(Effective Nov. 11, 1957) † Merchant Quality—Special Quality 35¢ higher

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme Newport Steel Co., Newport, Ky.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Conners Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Dearborn Div., Sharon Steel Corp.
D3 Drawn Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	⅛ In.		¼ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B5*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Youngstown *R5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fontana *K1*	+8.25	+23.5	+5.25	+19.5	+1.75	+15.00	0.75	+14.25	1.25	+13.25	1.75	+12.75	3.25	+13.00								
Pittsburgh *J5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Alton, Ill. *L1*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Sharon *M5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Fairless *N2*	3.25	+12.0	6.25	+8.0	9.75	+3.50	12.25	+2.75	12.75	+1.75	13.25	+1.25	14.75	+1.50								
Pittsburgh *N5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Wheeling *W5*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Wheatland *W4*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50								
Youngstown *Y1*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
Indiana Harbor *Y1*	4.25	+11.0	7.25	+7.0	10.75	+2.50	13.25	+1.75	13.25	+0.75	14.25	+0.25	15.75	+1.00								
Lorain *N2*	5.25	+10.0	8.25	+6.0	11.75	+1.50	14.25	+0.75	14.75	0.25	15.25	0.75	16.75	0.50	*9.25	+24.25	*2.75	+19.50	*0.25	+17.0	1.25	+15.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B5*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Youngstown *R5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Fairless *N2*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Fontana *K1*	+3.75		0.25		3.25		3.75		4.25		4.75		5.25									
Pittsburgh *J5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Alton, Ill. *L1*	7.75	+6.0	11.75	+2.0	14.75	2.50	15.25	1.25	15.75	2.25	16.25	2.75	16.75	1.50								
Sharon *M5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Pittsburgh *N5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Wheeling *W5*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Wheatland *W4*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50								
Youngstown *Y1*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50
Indiana Harbor *Y1*	8.75	+5.0	12.75	+1.0	15.75	3.50	16.25	2.25	16.75	3.25	17.25	3.75	17.75	2.50								
Lorain *N2*	9.75	+4.0	13.75	list	16.75	4.50	17.25	3.25	17.75	4.25	18.25	4.75	18.75	3.50	*7.75	+21.75	*0.25	+16.0	2.25	+13.50	7.25	+8.50

Threads only, buttweld and seamless 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ⅛, ¼ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 10¢ per lb.

(Effective Nov. 11, 1957)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.74	T-1
18	4	1	—	5	2.445	T-4
18	4	2	—	—	1.905	T-2
1.5	4	1.5	8	—	1.10	M-1
6	4	3	6	—	1.49	M-3
6	4	2	5	—	1.245	M-2

High-carbon chromium	.925	D-3, D-5
Oil hardened manganese	.475	O-2
Special carbon	.36	W-1
Extra carbon	.36	W-1
Regular carbon	.305	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	302				37.50
	304	37.95	42.25	46.70	40.00
	316	44.40	49.50	54.50	58.75
	321	40.05	44.60	49.30	47.25
	347	42.40	47.55	52.80	57.00
	405	29.85	33.35	36.85	.....
	410	29.55	33.10	36.70	.....
	430	29.80	33.55	37.25	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 40.25; 1 side, 33.95.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.525	6.50	6.975				
Cleveland *R3*							14.75
So. Chicago *R3*				9.75			
Ensley *T2*	5.525	6.50					
Fairfield *T2*		6.50		9.75		6.60	
Gary *U1*	5.525					6.60	
Huntington *C16*		6.50					
Ind. Harbor *I3*	5.525		6.975	9.75		6.60	
Ind. Harbor *Y1*				9.75			
Johnstown *B3*		6.50					
Joliet *U1*			6.975				
Kansas City *S2*				9.75			14.75
Lackawanna *B3*	5.525	6.50	6.975			6.60	
Lebanon *B3*			6.975		14.50		14.75
Minnequa *C6*	5.525	7.00	6.975	9.75		6.60	14.75
Pittsburgh *P5*							14.75
Pittsburgh *J3*				9.75			
Seattle *B2*				10.25		6.75	15.75
Steelton *B3*	5.525		6.975			6.60	
Struthers *Y1*				9.75			
Torrance *C7*						6.75	
Williamsport *S5*		6.50					
Youngstown *R3*				9.75			

COKE

	Net-Ton
Furnace, beehive (f.o.b.) Connellsville, Pa.	$15.00 to $15.75
Foundry, beehive (f.o.b.)	$17.50 to $19.00
Foundry oven coke	
Buffalo, del'd	$31.75
Detroit, f.o.b.	30.50
New England, del'd	31.55
Kearney, N. J., f.o.b.	29.75
Philadelphia, f.o.b.	29.50
Swedeland, Pa., f.o.b.	29.50
Painesville, Ohio, f.o.b.	30.50
Erie, Pa., f.o.b.	30.50
Cleveland, del'd	32.65
Cincinnati, del'd	31.84
St. Paul, f.o.b.	29.75
St. Louis, f.o.b.	31.50
Birmingham, f.o.b.	28.85
Milwaukee, f.o.b.	30.50
Neville Is., Pa.	29.25

LAKE SUPERIOR ORES

51.50¢; 1¢ natural content, delivered lower Lake ports. Prices for 1957 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field		9.625	
Armature	11.10	10.85	11.35
Elect.	11.80	11.55	12.05
Hermetic		12.10	
Motor	12.90	12.65	13.15
Dynamo	13.95	13.70	14.20
Trans. 72	15.00	14.75	15.25
Trans. 65	15.55		
		Grain Oriented	
Trans. 58	16.05	Trans. 80	19.20
Trans. 52	17.10	Trans. 73	19.70

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N9*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unbored.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	26.00	40	100, 110	10.70
20	72	25.25	35	110	10.70
18	72	25.75	30	110	10.85
14	72	25.75	24	72 to 84	11.25
12	72	26.25	20	90	11.00
10	60	28.00	17	72	11.40
10	48	28.50	14	72	11.85
7	60	28.25	12	60	12.95
6	60	31.50	10	60	13.00
4	40	35.00	8	60	13.30
3	40	37.00			
2½	30	39.25			
2	24	60.75			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$135.00
No. 1 Ohio	120.00
Sec. Quality, Pa., Md., Ky., Mo., Ill.	120.00
No. 2 Ohio	103.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00)	21.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$150.00
Childs, Hays, Pa.	155.00
Chicago District	160.00
Western Utah	175.00
California	180.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	157.00-160.00
Silica cement, net ton, bulk, Latrobe	28.50
Silica cement, net ton, bulk, Chicago	25.50
Silica cement, net ton, bulk, Ensley, Ala.	26.50
Silica cement, net ton, bulk, Mt. Union	24.50
Silica cement, net ton, bulk, Utah and Calif.	37.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$105.00
Standard chemically bonded, Curtiner, Calif.	115.00
Burned, Balt.	99.00

Magnesite Brick

Standard Baltimore	$131.00
Chemically bonded, Baltimore	116.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in: Pa., W. Va., Ohio	$16.75
Midwest	17.00
Missouri Valley	15.00

(Effective Nov. 11, 1957)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Annld ¢ lb.	Merch. Wire Galv. ¢ lb.
Alabama City *R3*	173	187		212	193	8.65	9.20
Aliquippa *J1****	173	190			190	8.65	9.325
Atlanta *A8***	175	192		214	198	8.75	9.425
Bartonville *K2***	175	192	178	214	198	8.75	9.425**
Buffalo *W6*						8.65	8.95*
Chicago *N4****							
Cleveland *A6*							
Cleveland *A5*						8.65	
Crawf'dav. *M4****	175	192		214	198	8.75	9.425
Donora, Pa. *A5*	173	187		212	193	8.65	9.20
Duluth *A5*	173	187		212	193	8.65	9.20
Fairfield, Ala. *T2*	173	187		212	193	8.65	9.20
Galveston *D4*	9.10‡						
Houston *S2*	178	192		217	198	8.90	9.45
Jacksonville *M4*	184 ‡	197		219	203	9.00	9.675
Johnstown *B5***	173	190	172		196***	8.65	9.325**
Joliet, Ill. *A5*	173	187		212	193	8.65	9.20
Kokomo *C9**	175	189		214	195*	8.75	9.30*
L. Angeles *B2****						9.60	10.275
Kansas City *S2**	178	192		217	198*	8.90	9.45*
Minnequa *C6‡*	178	192	177	217	198‡	8.90	9.45‡
Monessen *P6*					193	8.65	9.20
Palmer, Mass. *W6*						8.95	9.50*
Pittsburg, Cal. *C7*	192	210			213	9.60	10.15
Rankin, Pa. *A5*	173	187			193	8.65	9.20
So. Chicago *R3*	173	187			193	8.65	9.20
S. San Fran. *C6‡*				236		9.60	10.15‡
SparrowsPt. *B3***	175			214	198	8.75	9.425
Struthers, O. *Y1**						8.65	9.30
Worcester *A5*	179					8.95	9.50
Williamsport *S5*							

* Zinc less than .10¢.
** 11-12¢ zinc.
*** 10¢ zinc.
‡ Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26 0.40	0.41 0.60	0.61 0.80	0.81 1.05	1.06 1.35
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*		10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70		
Detroit *D1*	9.05	10.50	12.70	15.70	
Detroit *D2*	9.05	10.50	12.70		
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60		
Franklin Park, Ill. *T8*	9.05	10.25	12.45	15.45	18.40
Harrison, N. J. *C11*			12.90	16.10	19.30
Indianapolis *J3*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Pittsburgh *S7*	8.95	10.40	12.60	15.60	18.55
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*		10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *J3*	8.95	10.40	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
National Tube	2	13	36.34	42.56	35.22
	2½	12	48.94	57.31	47.43
	3	12	56.51	66.18	54.77
	3½	11	65.97	77.25	63.93
	4	10	87.61	102.59	85.53
Pittsburgh Steel	2	13	36.34	42.56	
	2½	12	48.94	57.31	
	3	12	56.51	66.18	
	3½	11	65.97	77.25	
	4	10	87.61	102.59	

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Machine and Carriage Bolts	Less than Case Price	30 Cases	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	49	54	56	57
⅝" thru 1" x 6" and shorter	35	40	43	45
Rolled thread carriage bolts ½" & smaller x 6" and shorter	49	54	56	57
Lag, all diam. x 6" & shorter	49	54	56	57
Lag, all diam. longer than 6 in.	39	44½	47	48½
Plow bolts ½" and smaller x 6" and shorter	49	54	56	57

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¼ in. or smaller	60½
⅝ in. to 1 in. inclusive	55½
1⅛ in. to 1½ in. inclusive	58½
1⅝ in. and larger	53½

C. P. Hex, reg. & hvy.	
¼ in. and smaller	60½
⅝ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½

Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	46½

Semi-finished Hex Nuts	
⅝ in. or smaller	60½
¾ in. to 1½ in. inclusive	55½
1⅝ in. and larger	53½

(Add 25 pct for broken case or keg quantities)

Finished	
⅜ in. and smaller	63

Rivets	
	Base per 100 lb
½ in. and larger	$12.25
	Pct. Off List
7/16 in. and smaller	19

Cap Screws

New std. hex head, packaged	*Discount (Packages) Full Finished H. C. Heat Treat*
¼" diam. and smaller x 6" and shorter	40 26
⅜", 7/16", and 1" diam. x 6" and shorter	22 3
¼" diam. and smaller x longer than 6"	8 +13
⅜", 7/16", and 1" diam. x longer than 6"	+ 6 +22
	C-1018 Steel Full-Finished Cartons Bulk
¼" through ⅝" dia. x 6" and shorter	58 49
¾" through 1" dia. x 6" and shorter	45 33

Minimum quantity ¼" through ⅝" diam. 15,000 pieces; 7/16" through ⅝" diam. 5,000 pieces; ¾" through 1" diam. 2,000 pieces.

Machine Screws & Stove Bolts

		Discount Mach. Screws	Stove Bolts
Plain Finish Cartons		19	32
Bulk	*Quantity*		
To ¼" diam. incl.	25,000-200,000	9	54
5/16 to ⅜" diam. incl.	25,000-200,000	9	54
All diam. over 3" long	5,000-100,000	—	54

Machine Screws & Stove Bolt Nuts

		Discount Hex	Square
In Cartons		16	19
In Bulk	*Quantity*		
#8 diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.7
Chicago	140.9
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 3 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue, source U. S. Pipe and Foundry Co.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	45.00
Electrodeposited	36.25
Brass, 80-20, ball anodes, 2000 lb or more	44.00
Zinc, ball anodes, 2000 lb lots	17.50
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carbon, 5000 lb	102.25
(Rolled depolarized add 3¢ per lb)	
Cadmium	1.70
Tin, ball anodes and elliptical $1.13 per lb.	

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	73.20
Copper sulphate, 100 lb bags, per cwt.	24.35
Nickel salts, single, 100 lb bags	40.50
Nickel chloride, freight allowed, 200 lb	45.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.05
(Philadelphia price 23.30)	
Zinc cyanide, 100 lb	59.00
Potassium cyanide, 100 lb drum N. Y.	48.00
Chromic acid, flake type, 10,000 lb or more	31.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots for minus 100 mesh

Swedish sponge iron, del. East of Miss. River, ocean bags, 25,000 lb. and over	10.5¢
F.O.B. Riverton or Camden, New Jersey, freight allowed west of Miss. River	9.5¢
Domestic sponge iron, 98+% Fe, 25,000 lb and over del'd East of Miss. River	10.5¢
F.O.B. Riverton, New Jersey, West of Miss. River	9.5¢
Canadian sponge iron, del'd in East, carloads	12.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.8(4% pure	22.0¢
Carbonyl iron size 3 to 20 micron, 98%, 99.8+% Fe	88.0¢ to $2.85
Aluminum, freight allowed	38.00¢
Brass, 10 ton lots	31.1¢ to 47.1¢
Copper, electrolytic	41.50¢
Copper, reduced	40.3¢ to 48.8¢
Cadmium, 100-199 lb. 95¢ plus metal value	
Chromium, electrolytic, 99.85% min. Fe .03 max. Del'd	$5.00
Lead	21.50¢ lb, f.o.b. plant
Manganese f.o.b. Extron, Pa	16.0¢
Molybdenum, 99%	$3.60 to $3.95
Nickel, chemically precipitated	$1.05
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed #80	$1.13
Silicon	13.50¢
Solder powder	13¢ plus met. value
Stainless steel, 302	$1.02
Stainless steel, 316	$1.30
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$3.75 (nominal)
Zinc, 5000 lb & over	17.5¢ to 20.7¢

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets: Hot-Rolled 18 ga. & hvr.	Sheets: Cold-Rolled 15 gage	Sheets: Galvanized 10 gage††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled merchant	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.64	8.97	9.05	9.01	10.68				
Baltimore	$.10	8.38	8.98	9.71	8.86	8.76	9.29	9.16	11.44*	16.18	15.18	19.73	18.98
Birmingham	.15	8.18	9.45	10.15	8.23	8.56	8.64	8.60	10.57				
Boston	.10	9.48	10.54	11.55	9.52	9.82	9.73	9.83	13.00	15.79	15.38	19.89	19.18
Buffalo	.15	8.40	9.15	11.22	8.65	9.05	9.05	8.95	11.05*	16.34	15.15	19.01	18.95
Chicago	.15	8.35	9.60	10.15	8.38	8.71	8.79	8.75	8.95	15.80	14.80	19.35	18.60
Cincinnati	.15	8.49	9.65	10.20	8.69	9.08	9.33	9.07	9.46	15.61	15.11	18.96	18.91
Cleveland	.15	8.33	9.60	10.10	8.48	8.94	9.16	8.84	10.95*	15.89	14.89	19.44	18.96
Denver	.20	9.70	11.30	12.49	9.80	9.70	9.80	9.98	10.65			...	17.60
Detroit	.15	8.58	9.85	10.50	8.73	9.06	9.33	9.05	9.30	15.46	15.06	18.81	18.86
Houston		8.45	9.75		8.60	9.05	8.60	8.55	11.10	16.20		19.30	19.05
Kansas City	.20	9.02	10.27	10.07	9.05	9.38	9.46	9.42	9.87	20.02	15.47	20.02	19.27
Los Angeles	.10	10.70	10.85	11.75	9.65	9.65	9.20	9.80	12.60	17.05	16.10	21.05	20.35
Memphis	.15	8.02	9.22		8.12	8.35	8.39	8.25	9.85				
Milwaukee	.15	8.48	9.73	10.28	8.51	8.84	9.00	8.88	9.18	15.43	14.93	18.78	18.73
New York	.10	8.97	10.23	10.66	9.41	9.53	9.45	9.67	12.86*	15.02	15.19	18.42	18.99
Norfolk	.20	8.00			8.40	8.35	8.70	8.45	10.70				
Philadelphia	.10	8.10	9.00	9.97	8.79	8.87	8.60	8.75	11.61*	15.61	15.11	18.96	18.91
Pittsburgh	.15	8.33	9.60	10.50	8.48	8.71	8.79	8.75	10.95*	15.80	14.80	19.35	18.60
Portland		8.50	11.20	11.55	9.05	8.30‡	8.65	8.65	14.50	18.50	16.10	20.75	20.25
San Francisco	.10	9.45	10.85	11.10	9.55	9.70	9.60	9.80	13.10	17.05	16.10	21.05	20.35
Seattle		9.95	11.15	12.00	10.00	9.70	9.80	10.80	14.05	16.55	16.35	20.65	20.15
Spokane	.15	10.10	11.30	12.15	10.15	9.85	9.95	10.25	14.20		17.35	21.55	21.05
St. Louis	.15	8.69	9.94	10.51	8.74	9.08	9.25	9.12	9.56	15.66	15.16	19.01	18.96
St. Paul	.15	8.94	10.19	10.76	8.99	9.45	9.53	9.37	9.81	.....	15.26	.....	19.06

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other or with galvanized sheets for quantity.

††10¢ zinc. ‡ Deduct for country delivery. ‡‡3/16 in. to ½ in. *C1018—1 in. rounds.

(Effective Nov. 11, 1957)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	
Birmingham *R3*	62.00	62.50*			
Birmingham *W9*	62.00	62.50*	66.50		
Birmingham *U4*	62.00	62.50*	66.50		
Buffalo *R3*	66.00	66.50	67.00	67.50	
Buffalo *H1*	66.00	66.50	67.00	67.50	
Buffalo *W6*	66.00	66.50	67.00	67.50	
Chester *P2*	66.50	67.00	67.50		
Chicago *I4*	66.00	66.50	66.50	67.00	
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50		
Fontana *K1*	75.00	75.50			
Geneva, Utah *C7*	66.00	66.50			
Granite City *G2*	67.90	68.40	68.90		
Hubbard *Y1*			66.50		
Ironton, Utah *C7*	66.00	66.50			
Midland *C11*	66.00				
Minnequa *C6*	68.00	68.50	69.00		
Monessen *P6*	66.00				
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*		66.50	67.00	67.50	
Sharpsville *S8*	66.00	66.50	66.50	67.00	
So. Chicago *R3*	66.00	66.50	66.50		
So. Chicago *W8*	66.00		66.50	67.00	
Swedeland *A2*	68.00	68.50	69.00	69.50	
Toledo *I4*	66.00	66.50	66.50	67.00	
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	74.00
Youngstown *Y1*			66.50	67.00	

DIFFERENTIALS: Add, 75c per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct); 50c per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31/0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1* $79.25; Jackson *J1, I4* (Globe Div., $78.00; Niagara Falls (5.01/15.50), $101.00; Keokuk (14.01/14.50), $103.50; (15.51/16.00), $106.50. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.25 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under 10 pct phos.): $64.00. Add $1.00 premium for all grades silvers to 18 pct.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.00	23.75	23.25	25.25	—	27.00	39.75	32.25	37.00	—	16.75	—	17.00
Slabs, billets	27.00	27.00	28.00	31.50	32.00	33.25	49.50	40.00	46.50	—	21.50	—	21.75
Billets, forging	—	36.50	37.25	38.00	41.00	40.50	62.25	47.00	55.75	32.00	28.25	28.75	28.75
Bars, struct.	42.00	43.00	44.25	45.00	48.00	47.75	73.00	55.50	64.75	37.75	33.75	34.25	34.25
Plates	44.25	45.00	46.25	47.25	50.00	50.75	76.75	59.75	69.75	40.25	35.00	36.75	36.00
Sheets	48.50	49.25	51.25	52.00	—	55.50	81.50	65.50	79.25	48.25	40.25	—	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	—	55.50	81.50	65.50	79.25	48.25	40.25	—	40.75
Wire CF; Rod HR	40.00	40.75	42.00	42.75	45.50	45.25	69.25	52.50/52.75	61.50	35.75	32.00	32.50	32.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A5;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2,* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R5;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A5;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton Massillon, O., *R5;* Harrison, N. J., *D5;* Youngstown, *J5;* Sharon, Pa., *S7;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1;* New Bedford, Mass. (.25¢ per lb higher), *R6;* Gary, *U1* (.25¢ per lb higher).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1,* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa. *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A5;* Massillon, O., *R5,* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A5;* Waukegan, *A5;* Canton, O., *T5, R5;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1.*

Wire: Waukegan, *A5;* Massillon, O., *R5;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D5;* Baltimore, *A7;* Dunkirk, *A5;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2.*
Structurals: Baltimore, *A7;* Massillon, O., *R5;* Chicago, Ill., *J4;* Watervliet, N. Y., *A5;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Brackenridge, Pa., *A5;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown; *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R5;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Midland, Pa., *C11,* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R5;* Watervliet, *A5;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1.*

(Effective Nov. 11, 1957)

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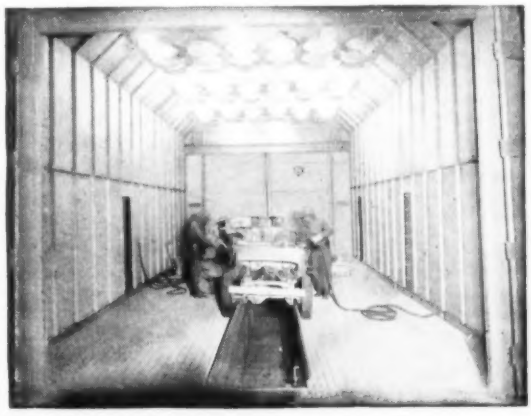

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Our 60TH ANNIVERSARY YEAR

The **MACLEOD** Company
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FERROALLOY PRICES

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C	41.00	0.50% C	38.00
0.05% C	39.00	1.00% C	37.75
0.10% C	38.50	1.50% C	37.50
0.20% C	38.25	2.00% C	37.25

4.00-4.50% C, 60-70% Cr, 1-2% Si.. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si ... 27.50
0.025% C (Simplex) ... 36.75
8.00% max C, 50-55% Cr, 3-6% max Si 25.00
8.50% max C, 50-55% Cr, 3% max Si 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.31
0.50% max. C	1.31
9 to 11% C, 88-91% Cr, 0.75% Fe	1.40

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅝" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.29
Ton lots	1.31
Less ton lots	1.33

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.

Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads	27.50	14.20
Ton lots	32.75	15.65
Less ton lots	34.35	17.30

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Ca, 60-65% Si, 3.00 max. Fe.

Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 2% Fe ½ in. x 12 mesh.

Ton lots	21.15
Less ton lots	22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O., Alloy, W. Va., Sheffield, Ala., Portland, Ore.	12.25
Johnstown, Pa.	12.25
Sheridan, Pa.	12.25
Philo, Ohio	12.25
S. Duquesne	12.25

Add or substract 0.1¢ for each 1 pct Mn above or below base content

Briquets, delivered, 66 pct Mn:

Carloads, bulk	14.80
Ton lots packed	17.20

Spiegeleisen

Per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$100.50
19 to 21%	3% max.	102.50
21 to 23%	3% max.	105.00

Manganese Metal

2 in. x down, cents per pound of metal delivered.

95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	34.00
Ton lots	36.00
250 to 1999 lb	38.00
Premium for Hydrogen - removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn ... 25.50

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C	33.60	36.40	37.60
0.30% max. C	32.10	34.90	36.10
0.50% max. C	31.60	34.40	35.60
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	28.60	31.40	32.60

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carloads bulk	12.80
Ton lots, packed	14.45
Briquet contract basis carloads, bulk, delivered, per lb of briquet	15.10
Ton lots, packed, pallets	16.50

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots, packed	Carloads, packed
96.75% Si, 1.25% Fe	24.20	22.90
98% Si, 0.75% Fe	24.95	23.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.

Carloads, bulk	7.70
Ton lots, packed	10.50

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	13.00	75% Si	16.40
65% Si	15.25	85% Si	18.10
	90% Si	19.50	

Ferrovanadium

50-55% V delivered, per pound, contained V, carloads, packed.

Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.95	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo ... $1.28

Ferrocolumbium, 50-50%, 2 in. x D, delivered per pound contained Cb.

Ton lots	$4.90
Less ton lots	4.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Sb plus Ta ... $4.25

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo ... $1.68

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton ... $90.00
10 tons to less carload ... $110.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.50
Less ton lots ... $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton ... $240.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ... $2.60 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. ... $1.41
bags, f.o.b. Washington, Pa., Langeloth, Pa. ... $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump	18.50¢
Ton lots, packed lump	20.50¢
Less ton lots	21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 ... $1.38

Zirconium, per lb of alloy

35-40% f.o.b. freight allowed, carloads, packed	27.25¢
12-15%, del'd lump, bulk-carloads	9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload ... $5.50

Bortram, f.o.b. Niagara Falls.

Ton lots per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ... 14.00¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots, F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19%	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max C, 3.00% max. Fe, balance Ni, del'd less ton lots ... 2.15

(Effective Nov. 11, 1957)

TAKING
STOCK
IS GOOD
BUSINESS
If you're in business, you take inventory at least once a year. It's essential to the health of your business to know where you stand. But have you taken stock of yourself recently? Do you know where you stand when it comes to cancer?
A once-a-year health checkup can tell you.
The chances of curing cancer are far greater when it is detected early and treated promptly. Living proof are the 800,000 Americans who *have been cured.*
Yet lung cancer now kills 24,000 men annually...eight times as many as twenty years ago. And thousands of these deaths could have been prevented *if the cancer had been diagnosed early and treated promptly.*
That's why it's vital for every man to have a health checkup every year, including a chest x-ray. Further, if a cough or hoarseness lingers for more than two weeks – one of cancer's danger signals – an immediate visit to the doctor is indicated.
Give yourself the same break you give your business. Take that personal inventory regularly – have a health checkup every year.
AMERICAN CANCER SOCIETY

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All Types

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Diesel, Steam, Gasoline
Diesel-Electric

SPECIAL

STANDARD GAUGE CARS

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5—Austin-Western 1—Pressed Steel Car

ORE HOPPER CARS

660 Cubic Feet
40- and 50-Ton Capacity

COVERED HOPPER CARS

10—70-Ton Capacity

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6,000- 8,000- and 10,000-Gallon
Cleaned and Tested

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Overhead and Locomotive

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"ANYTHING containing IRON or STEEL"

High Prices Slow New York Market

Used machinery dealers there find their customers often worried about financing purchases.

Buyer resistance fades at auctions, however, where equipment at over-market prices is quickly snapped up.

■ "Lack of money and lack of confidence are the troubles with this market," comments a leading New York area machinery dealer. "Many tools are overpriced in terms of today's market. They could be replaced for less than the dealer paid for them," adds another.

Money, in one form or another, is the root of trouble in today's depressed tool market in the Northeast. One dealer reports his inquiries are running high, but final sales are lagging. "They like everything about my tools but the price," he comments. He adds that in many cases it's not so much a feeling that the price itself is too high; more often, the price is just more than the prospective buyer can finance.

Replacement Value Less—Dealers feel their stocks are unusually good at present; that they can easily supply high-grade late-model tools in most categories. But the price is a real handicap. As noted above, some replacements to stock can be made at lower prices. But this only hinders the dealer when he tries to recover his investment in the tools he already has. Some dealers also point out that replacements for some tools are almost impossible to find. Fabricating equipment is singled out as being particularly scarce.

Way Up in Air—Paradoxically, auction sales do not encounter the same price resistance found in dealers' plants. One dealer refuses to go to auctions unless he has a direct commission to buy for a customer. Auction prices recently have been too high for the dealers to pay and still reasonably expect a profit on resale.

This phenomenon has the trade frankly baffled. They point out that auction buyers must put up a lot of cash for machines in as-is condition. On top of that the buyer must pay all moving and installation charges, frequently from a remote site. To top it off, inspection is necessarily cursory at auctions. Many dealers are emphatic in saying that the auction customer usually ends up paying more for a poorer tool than he would pay for a carefully reconditioned machine bought through regular dealers.

More Promotion?—Some observers believe that this situation should be met by increased promotional effort by the used and rebuilt machinery industry. One dealer wonders whether financing agencies are misled into thinking that tool buyers fare better at auction sales, suggests an educational campaign if this proves to be the case.

News of the slump in new machine tool orders has not cheered the trade. But many believe that price is an important factor for new tools also. If this is true, they are confident that many buyers will ultimately turn to the rebuilt market for savings. But the trade generally sees little chance of an immediate spurt in this area.

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AIR COMPRESSORS
150 cu. ft. Ingersoll Rand XRE 8" x 8" & 5½" x 8" 100 lb. Pressures, 100 H.P. A.C. Syn. Motor
2700 cu. ft. Ingersoll Rand PRE2, 30" x 18" x 21" 100 lb. Pressures, 500 H.P. Syn. Motor

BENDING ROLLS
10' x 10" Ga. Bertsch Initial Type
10' x 5/8" King Pyramid Type
12' x 5/8" Hilles & Jones Pyramid Type
16' x 3/4" Ransome Pyramid Type

BRAKE—PRESS TYPE
12' x 1/2" Cincinnati

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	56' Span	220-3-60
4 ton Cleveland	60' Span	115 Volt D.C.
8 ton P&H	55' Span	220-3-60
10 ton Shepard Niles	58' Span	440-3-60
10 ton Shaw	120' Span	230 Volt D.C.
15 ton Shepard Niles	52' Span	230 Volt D.C.
15 ton Shepard Niles	55' Span	220-440 A.C.
15 ton Niles	75' Span	230-3-60
20 ton P&H	55' Span	220-440 A.C.
20 ton MM&M	72' Span	230 Volt D.C.
With two 10 ton Trolleys		
120 ton Shepard Niles	77' Span	220-3-60

CUT OFF MACHINE
#2A Modern Automatic Cut Off Machine For Pipe, Tubing, Bars to 2" O.D.

DIEING MACHINE
150 ton Henry & Wright, 3" Stroke, Roll Feed Scrap Cutter, 30 H.P. A.C. Motor

FORGING MACHINES
1" to 5" Acme, Ajax, National

HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING
500 lb. to 20,000 lb. incl.

HEADERS
#250C Manville Solid Die Single Stroke
#44 Waterbury Farrel DSOP, Cap. 5/8" x 6"

LEVELLERS—ROLLER
18" Cincinnati, 15 Rolls 2½" dia.
32" Torrington, 19 Rolls 1 31/32" dia.
60" Aetna 17 Rolls 4¾" dia.

PLANER
72" x 72" x 16' Detrick & Harvey Four Head

PRESSES—HYDRAULIC
250 ton AEC'o Straightening 4 Column, 16" Stroke, 62"x25" Between Columns, 16' Long Bed
500 ton HPM Fastraverse, Bed 36"x36"
1500 ton Bliss 15" Stroke, Bed 49"x48"
1500 ton Mesta Steam Hydr. Forging Press
2000 ton Bliss 18" Stroke Bed Area 54"x50"
4500 Baldwin-Lima-Hamilton Hydr. Forging Press

PRESSES—STRAIGHT SIDE
180 ton Hamilton #347, 12" Str. 85½" Bet. Ups
200 ton Clearing F1200-42, Stroke 30", Bed 11'x38"
250 ton Bliss #88 12" Str. Bed 29" x 29"
250 ton Bliss SI 7½" Str. Bistr. 33" x 39"

PRESSES—KNUCKLE JOINT
600 ton Clearing K-1600-36, 4" stroke, Bed 36"x36"
1500 ton Verson, 4" Stroke, Bed 48"x48"

PUNCH & SHEAR COMBINATIONS
Cleveland Style EE, Arch Jaw Capy. 1¼" x 1"
Cleveland Style G Single End, 60" Throat
Cleveland Style W, 60" Throat, Architectural Jaw
#7 Kling, 72" Throat, With Thomas Duplicator

ROLLING MILLS
6" x 5" Torrington Wire Flattening Mill Line
8" x 16" Schmitz Single Stand Two High
10" x 14" Single Stand Two High
10" x 16" Single Stand Two High
12" x12" Single Stand Two High
12" x 16" Single Stand Two High
16" x 24" Single Stand Two High
20" x 36" Single Stand Two High

ROLL—PLATE STRAIGHTENING
108" Bertsch, Seven Rolls 9" Dia.
42" Niles, 7 Rolls 9" Dia. Motor Driven

SHEAR—ALLIGATOR
No. 4 Mesta RH Lh., Capacity 2" x 12"

SHEARS—GATE
6' x 1/4" Hilles & Jones #6
12" x 3/8" Niagara Model 1212, NEW 1951

SHEAR LINES
36" x .029 Ga. Halliden Shear Line
55" x 3/8" Heavy Duty Shear Line
60 x 7 Ga. Shear Line
96" x 14 Ga. Cleveland Shear Line

SHEARS—SQUARING
6' x 10 Ga. Niagara No. 672
10' x 1/4" Cincinnati #1810
10' x 3/8" Cincinnati #2510

SHEARS—ANGLE
6 x 6 x 3/4 Hilles & Jones
4 x 4 x 5/8" Long Allstatter

SLITTERS
24" Yoder Slitting Line
36" Paxon Slitting Line

STRAIGHTENERS
No. 3 Medart 9 Roll, Capacity to 4½" Tubing
12 Roll Aetna Standard, Capacity 2¾ O.D.

SWAGING MACHINES
#4 Fetn, Capacity 2¾" Tubing, LATE
#8½A Fetn, Capacity 3⅜" Tube, 1¾" Solid, 16" Die Length Hydraulic Feed, LATE

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New England Butt Co. 4 Bobbin Planetary cablers Model X-30A, Robbin Size 16" x 19½"
Vaughn Wire Drawing Machine, 4 Blocks 22" Dia Complete elect. equip. for each block

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200 KVA Federal No. 70 flash butt welder

50 KW Sciaky Dynatrol automatic cycle press type spot welder

7½" National high duty air clutch upsetting, forging

4" National high duty upsetting, forging, airclutch, new 1944

4" National high duty upsetting, forging, 4 point clutch with air operator

3" 3½" Ajax upsetter steel frame

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1½" National all steel upsetting, forging, hard ways

1" National high duty upsetting, forging, new 1947, air clutch

Economy type R automatic threading, pointing machines (2)

Economy type KK automatic bolt head shaving, pointing machine

38" throat New Doty Mfg. No. 17F single geared single end punching and shearing, MD

36" Rockford openside universal shaper-planer, mechanical, motor drive

10½" x 10½" No. 3 Motch & Merryweather circular cold metal saw, MD

Cleveland cradle type uncoilers, 50"-72" wide, 52" dia., hydraulic

750 ton No. 3 National Maxipress, all steel, forging, air clutch

Write for latest list No. 207.

MILES MACHINERY CO.
PHONE SAGINAW PL 2-3105
2041 E. GENESEE AVE. SAGINAW, MICH.

2000# Chambersburg Pneumatic Forging Hammer, Late Type, Serial 20CH392L7.

4000 lb. Chambersburg Double Frame Steam Forg. Hammer

2500 lb. Erie Single Leg Steam Forg. Hammer

Bliss Trimming Presses Tie Rod Construction Side Shears Capacities 113, 150, 190 tons

United Engineering & Fdry. Alligator Shear Clutch operated; Cap. 6½" Sq.

3—2-ton Denison Auto. Hopper Feed & Index Table Hydr. Multipress

2500 lb. Model E Chambersburg Steam Drop Hammer, New 1944

6' x 10 ga. Cincinnati Squaring Shear

¼" x 8' Pexto Gate Shear; 20" throat

4" National High Duty Upsetting & Forging Machine, air clutch, also one with reqular clutch, also 1", 2", 3"

Williams White Bulldozers from 5-ton to 300-ton

Landis Landmaco and other Landis Threading Machines

Single & Double End Punches

No. 3 Motch & Merryweather Saw, with Saw Grinder

No. 3 Waterbury Farrel Progressive Header, Cap. ½"; 4 stations and 1 Cutoff

BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MACHINES.

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REBUILT — GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	KW	Make	RPM	D.C. Volts	A.C. Volts
5	1500	Al.Ch.	514	350/700	13800/6900/4160
1	1500	G.E.	514	250	2300/4000
1	1450	Whse.	900	600	2300/4000
2	1250	Al.Ch.	720	600	2300/4000
1	850	G.E.	720	240/350	2300
1	725	Whse.	900	600	2300/4000
1	500	Cr.Wh.	720	600	2300/440
1	500	G.E.	900	250	2300
4	300	Whse.	1200	125/250	2300
1	300 (3-unit)	Al.Ch.	1200	250/300	2300
2	200	Whse.	1200	125/250	2300/440
2	150	Rel.	1200	125	2300/440
1	150	Whse.	1200	125/250	2300/440
1	150	G.E.	1200	250	4600/2300
1	100	Whse.	720	125/250	220
1	75	Whse.	1200	125/250	2300

2—400 KW, G.E. sealed Ignitron Mercury Arc Rectifiers complete with AC and DC switchgear and 475 KVA Pyranol Transf. 2400 V. 3 ph., 60 cycle.

DIRECT CURRENT MOTORS
230-Volt

Qu.	H.P.	Make	Type	R.P.M.
1**	1500	Whse.	Excl.	600
1**	700	Whse.	Excl.	143
1	700	Whse.	Excl.	300/700
2**	600	Whse.	Mill	300/1600
2	600	Whse.	QM	110/220
1	400	G.E.	MPC	450
1	300	Whse.	Mill	300/900
1	300	Whse.	Mill	300
2	275	Whse.	QM	425/850
1	200/250	El.Dy.	Ped. Brg.	400/1200
1	180	G.E.	MPC	400
1	175	G.E.	CD-175-A	850/1025
1	125	Whse.	SK-184	575/850
1	80	Rel.	654-T	575/1150
1	80	El.Dy.	25-S	525/1050
1	60/75	Whse.	SK-134	250/1000
1	50	Whse.	SK	500/1500
1	50	Whse.	SK-141	250/1000
2	30/40	Whse.	SK-143	500/1500
1	35	Whse.	SK	250/1000
1	32½	Whse.	SK-150	400/1200
1	25	Whse.	SK-121	200/1200
2	15	Whse.	SK-93	575/1725
3	7.5/7½	Rel.	T.E.F.C.	337/1350

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Leveller 17 Roll Backed Up 3" by 30" Feeder.
Leveller 5 Roll 5¼" by 30" Hvy. Duty Feeder.
Grading Mill 6" by 5" Standard. 2 Hi Roller Bg.
Diesel Generator 50 KW 250 V DC Cummins/GE.
Compressor 4,000#. 150 HP Syn Mtr. Torpedo Charger.
MG Set GE 250 KW 250 V DC 720 RPM 375 HP 220 v
Tube Bender W&W 1¼ Universal Hyd. 15HP 440v.

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800 TON MILES WHEEL PRESSES

(2) Late Type 800 ton Wheel Presses, 96" between bars; max. dist. ram and resistance head 9'3" wgt. each 65,000 lbs.

(1) 32" Ohio Dreadnaught Shaper, M. D.

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Excello 56—3 way Boring Machine.
Cinn. 4—48 Hydro Duplex.
Cinn. 10" x 18" Plain Grinder, 1938.
B & S No. 2 Surf. Grinder, Exc. Spin.

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1—34" REVERSING HOT STRIP MILL CONSISTING OF:

1—Slab re-heating furnace 44" wide x 93'4" long, 4 heating zones, oil and gas burners.

1—Mill drive motor, reversing, 2500 HP, 75/150 RPM, 600 volt D.C., with controls.

1—28" x 40" 2-high reversing mill having Morgoil bearings in roll stand, Timken bearings in pinion stand, universal spindles with carriers, 75 HP motor screw-down.

2—Re-heating coiling furnaces, each 50" wide, for gas or oil fuel, for coiling and uncoiling strip under tension while being rolled to thinner gauges.

1—Delivery table, 38" wide x 136'6" long, with anti-friction bearings. Speed 900 FPM.

1—Coiler 24" dia., driven by 100 HP, 485 1200 RPM motor. Timken bearings. Air push-off.

1—Coil discharge gravity conveyor 70'4" long.

1—Main motor-generator set for supplying reversing motor; also auxiliary generators.

All of the above equipment is in good operating condition, has been used very little. Further details will be furnished upon request.

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2220 Oliver Building, Pittsburgh 22, Pa.
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$1,168,000 SEALED BID EQUIPMENT SALE

Sealed bids on Invitation No. GS2-USD-S-58-18 will be received at this office until bid opening time, 10:00 AM, December 12, 1957.

This sale consists of approximately $1,168,000 of used machine tools, motors and miscellaneous equipment. A partial list of the machine tools being offered for sale includes:—lathes, welders, grinders, milling machines, pantograph etcher, counter sinking machines, milling and facing machines, boring machines, generator sets, electric motors, polishing machines, presses, drilling machines and many other types of machinery and equipment.

Property is located at General Services Administration, Defense Material Service Preservation Depot, Foot of Burlington-Bristol Bridge, Burlington, New Jersey.

The inspection dates are from November 18, through December 10, 1957 except Saturdays, Sundays and holidays, between the hours of 9:30 AM and 3:30 PM.

For bid forms and other information, contact

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250 Hudson Street, New York 13, New York. Phone No.: AL 5-4300, ext. 274

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LOGEMANN BALING PRESS
MODEL 114P

Produces bale 24" x 12" x 18". Has press box 100" long x 36" wide x 24" deep. Output 20-30 bundles/hour. Wt. 250#-300# each. Self contained pumping unit mounted on press. Excellent condition. Save 60% on replacement price. Late model. Location: Eastern Seaboard.

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4/0 BARE 19 AND 7 STRAND H. D.
LENGTHS APPROX. 500 FT. AND UP
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TOTAL OF 17,500-KW IN M.G. SETS

5—3500-KW, 3 Unit, Allis-Chalmers, Motor Generator Sets. Each consisting of:
2—1750-KW, 250/350 Volts parallel, 500/700 Volt series, 514 RPM, 5000 Amp., type HCC, rated continuous at 40 Deg. C. Allis-Chalmers DC Generators with Class B Insulation, separately excited, direct connected in the center to:
1—5000-H, 3730-KW, (3800 Volts (6900 volts), 3 Phase, 60 cycle, 514 RPM, 162 Amps. Allis-Chalmers Synchronous Motor with Class B Insulation, rated continuous at 40 Deg. C. Rise.
Each set equipped with a 40-KW exciter for synchronous motor fields, and a 10-KW exciter for generator fields, both 250-VDC at 514 RPM.
All mounted on a structural steel base approximately 27' long x 11' wide.
These units are of the very latest type and design—condition excellent—were used only a short time—AC and DC Switchgear available. For any additional information and price, please contact one of the following dealers closest to you:

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Brazos Engineering Co., Inc.
P. O. Box 9114, Houston, Texas
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MATERIALS HANDLING
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over 25 years experience
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FOR SALE OR RENT
1—1 yd. Northwest 41 Diesel Crane.
1—25 ton Bay City Truck Crane.
2—30 ton Gasoline and Diesel Locomotive Cranes.
1—44 ton G.E. Diesel Electric Locomotive.
1—100 ton G.E. Diesel Electric Locomotive.
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NEW MOTORS AVAILABLE:
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Special low prices.
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For Sale

400 TONS PRESS BRAKE by Craig & Donald. All steel construction. Capacity 10 ft. wide x ¾" thick. Motor driven. Max. daylight (stroke down) 18". Weight abt. 29 tons.

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MELTING FURNACES
3 KW AJAX Spark Gap Convertor
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250 lb. LECTROMELT Arc Melting Furnace
1½ Ton LECTROMELT Arc Melting Furnace
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4 Ton Top Charge ELECTRIC FURNACE—Like New

HEAT TREAT FURNACES
1—LEE WILSON 150 KW, 5'6" x 8' I.D. Pit type
1—L.&N. 25 KW Homocarb Furnace
1—L.&N. 75 KW, 25" x 48" Electric Pit

CLEANING EQUIPMENT
15" Cont. AMERICAN Tumblast, 4 tons per hour
36" Cont. AMERICAN Tumblast, 15 tons per hour
36 x 42 WHEELABRATOR w skip loader
48 x 42 WHEELABRATOR w skip loader
48 x 48 WHEELABRATOR w skip loader

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100,000# TINIUS OLSEN Mechanical Beam Testing
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AMERICA'S LARGEST STOCK OF FOUNDRY EQUIPMENT

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10" DIA. x 16" STANLEY 2 HIGH ROLLING MILL
Herringbone Mill Pinions and Herringbone Gear Drive.
Anti-friction Bearings to Gearcase.
4¼" Vertical Adj. of Top Roll.
Mill Complete and Ready to Run.
Extra Set of Rolls. 75 H.P. Motor Drive.

EXCELLENT CONDITION

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STAMPING PRESSES
SQUARING SHEARS • PRESS BRAKES
REBUILT *and* GUARANTEED

WILL LEASE WITH OPTION TO PURCHASE, OR
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600 NET TONS
80 LB. RELAYING RAIL
LOCATED KANSAS CITY, MISSOURI
PRICED TO SELL

Also All Other Sizes
RELAYING RAIL, RAILROAD EQUIPMENT AND ACCESSORIES

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2nd and Riverview (X-334)
KANSAS CITY 18, KANSAS
ATwater 1-9305

Turn your Scrap into Usable Steel—plates with a 9' by 3/16" cap, roller leveller, 7 roll, 9" x 9", new 1941 mfg. by Bertsch—cost new today $19,750—our selling price $8,975.

PUBLIC SALES, INC.
214 56th St., Va. Beach, Va. Phone 3171 M

eastern Rebuilt Machine Tools
THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

ENGINE LATHES
20" x 192" centers American Pacemaker, m.d.
25" x 49" centers LeBlond Geared Head, m.d., taper
25" x 84" centers Reed Loose Change, cone
25" x 120" centers LeBlond, m.d., taper
25" x 20" centers Boye & Emmes, 1 year old
27" x 96" centers American H.D., m.d., late
30" x 76" centers Niles-Bement-Pond, m.d., taper
32" x 23' centers Boye & Emmes, m.d.
42" x 31'—11½" centers American H.D., m.d.
42" x 85'—9" centers American, m.d.

MANUFACTURING LATHES
12 x 33", 20" x 25" Jones & Lamson Fay Automatic Lathes, 1944
12 x 18" Reid Small Piece Production Lathe, Model 6WSL, m.d.
No. 3 Lodge & Shipley Duomatic, m.d., late type
No. 3A Lodge & Shipley Duomatic, m.d.
No. 4 LeBlond Boring Lathe, 37" bed, 4" hole, m.d., latest
No. 9, 12 LeBlond Multi-Cut, m.d.
No. 16 LeBlond Automatic, m.d.
4 x 60", LoSwing, m.d.
8 x 132" LoSwing, m.d., latest
11 x 18" LeBlond Rapid Production, m.d.
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Model U, 14" x 24" centers, LoSwing, m.d.
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No. 10 Sundstrand Automatic Production Lathe, m.d.
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No. 5 Cincinnati H.P., m.d., late
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1	2250	Elliott		600	200/300
1	2200	G.E.	MCF	600	400/500
1	1750	Elliott		250	175/350
1	1325	G.E.	MCF	415	1300
1	1200	G.E.	MCF	600	450/600
1	940	Whse.	QM	250	140/170
3	800	G.E.	MCF	250	400/750
3	450	Whse.		550	415
2	300	G.E.	MPC	230	400
2	200	Whse.	CR-207-I	250	850/1200
2	125	Whse.	SK-190	230	450/1200
1	150	G.E.	CDBB	600	250/700
1	150	Cr. Wh.	65-H	230	1150
1	125	Whse.	SK-185	230	350/1050
1	125	Whse.	SK-183	230	850
2	100	Whse.	SK-181	230	450/1000
1	60-100	G.E.	RF-17	230	450/900
1	75	G.E.	CD-1231	230	850
2	75	Cr. Wh.	53HTEFC	230	860
1	50	G.E.	MD-412-AE	230	550
6	40	Rel-BB	385FTEFC	230	500/1500
1	30-40	Whse D.P.	SK-131.5-BB	230	500/1500
3 (unused)		30 G.E.	CDM-85-BB	230	2200

MG SETS—3 Ph. 60 Cy.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
2	2000/2100	G.E.	450	250/300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
2	1000	G.E.	720	600	6600/13200
1	750	G.E.	520	125/250	2300/4600
1	500	Whse.	900	125/250	440
1	500	G.E.	900	125/250	440/2300
2	300	G.E.	1200	250	2300
1	250	Whse.	1200	275	2300
1	200	El. Mx.	1200	250	2300/4600
1	200	Whse.	1200	550	2300
1	200	G.E.	1000	250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	1500	G.E. auto	HT	3	4000/4200/4400
3	1000	G.E.	HVDDI	3	2400 x 480
3	1000	G.E.	OA/FA	3	13800 x 230/460
2	750	G.E.	Pyranol	3	4800 x 83/55
3	500	Kuhl	OISC	1	13200 x 6600
3	500	Mehoney	OISC	1	6600/13130Y x 2200/1000Y
1	225	Marcus	Auto-air	3	208/220
Unused					
3	150	G.E.		1	23000 x 2300/1000Y
3	100	Whse.	OISC	1	4600/2300 x 460/230/115
3	100	G.E.	OISC	1	22500 x 2300/1150Y
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500	G.E.	M-6345Z	1200
250	Al.-Ch.	ANY-626J	1800
250	*G.E.	I-M-17A-10	720
200	G.E.	I-M-16	600
200	*Westg.	CW-950A	514
150	Cr.-Wh.	50R	1800
150	West.	CW-874C	720
150	Al.-Ch.	ANY	600
125	G.E.	I-M-15A	600
125	G.E.	I-M-15A	600
100	G.E.	I-M-E13A-1	1800
100	G.E.	I-M-13	900
100	*G.E.	I-M	720
100	G.E.	I-M-15A	450
75	North-W.	EW-50	1800
75	G.E.	MT-347-6	1200
75	G.E.	I-M-13	1200
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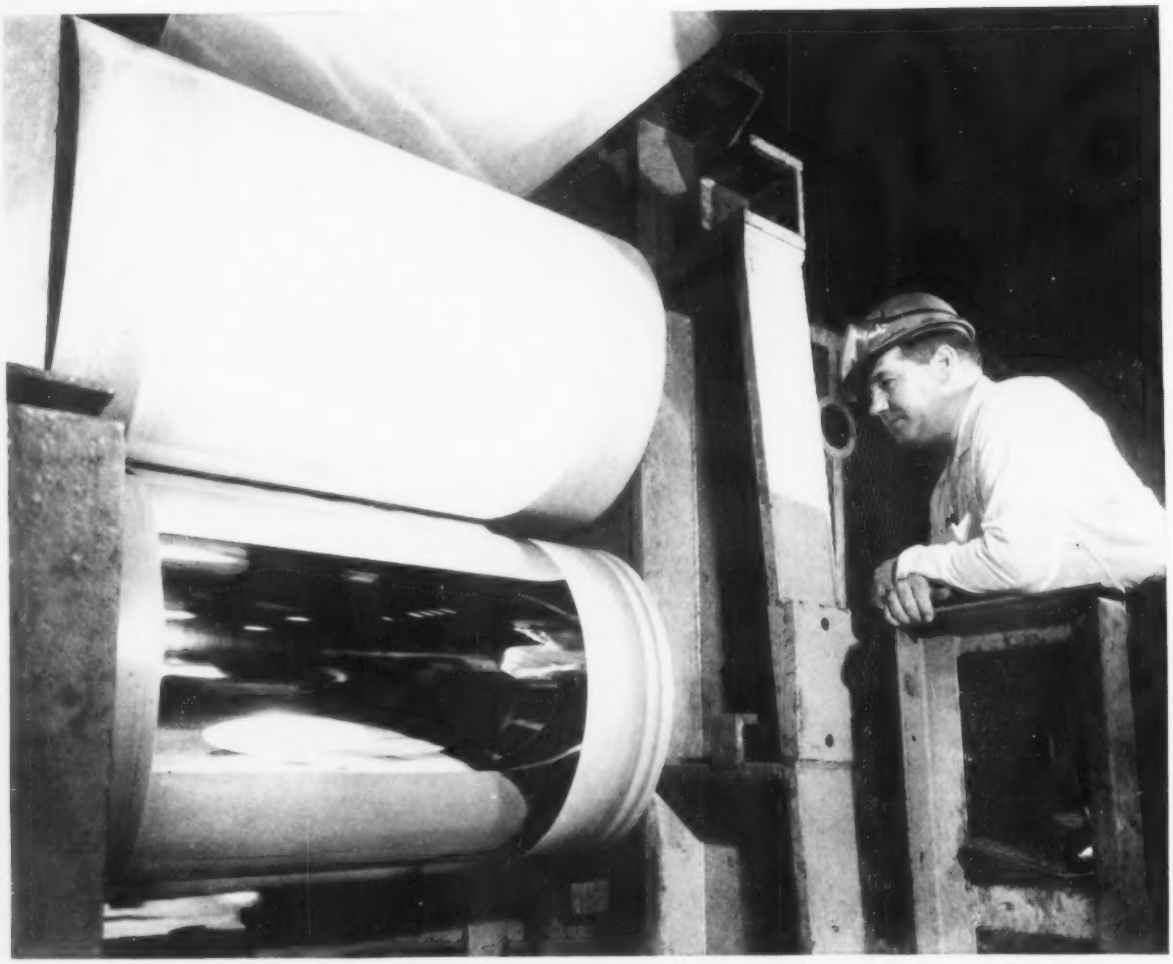

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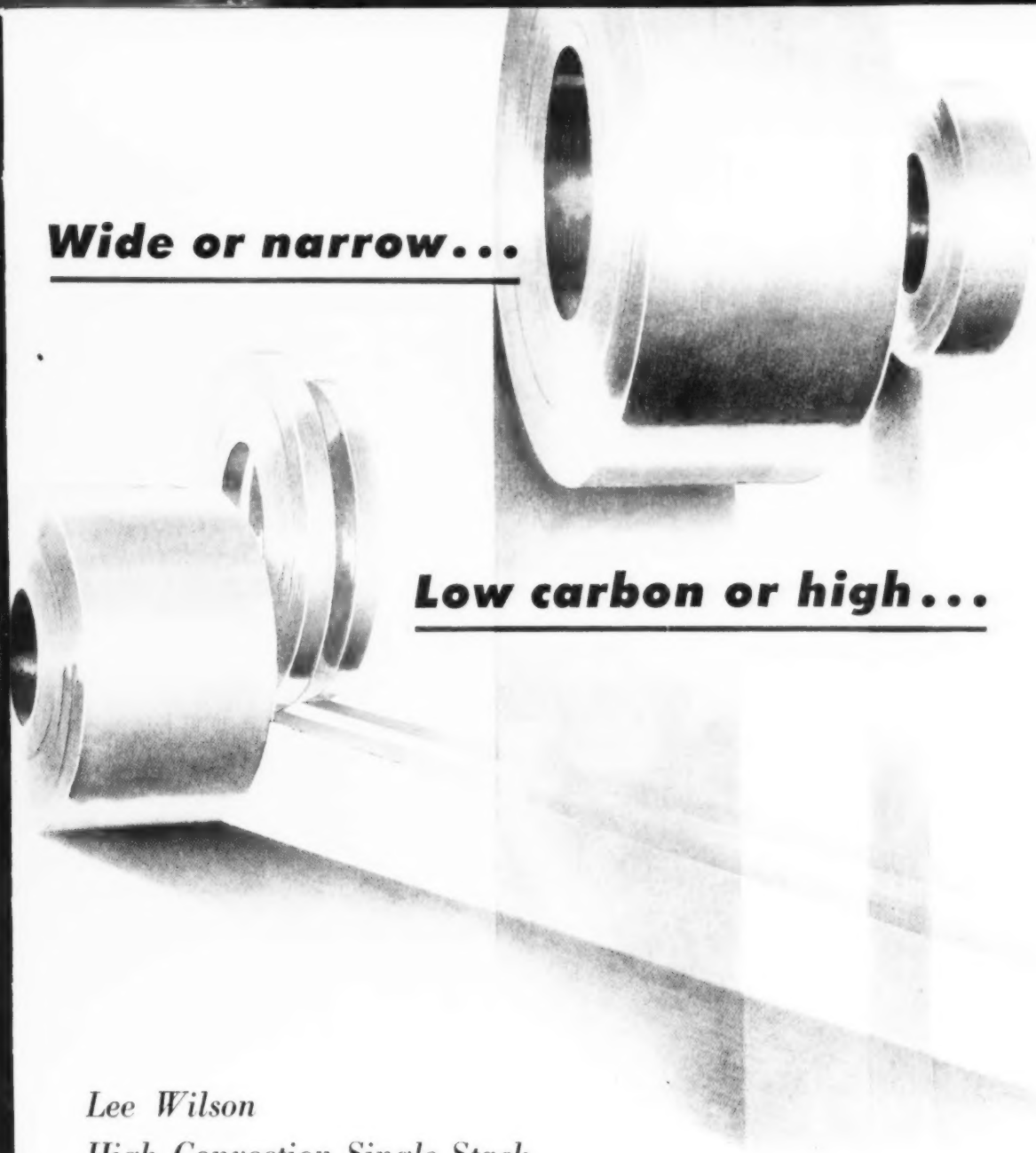

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